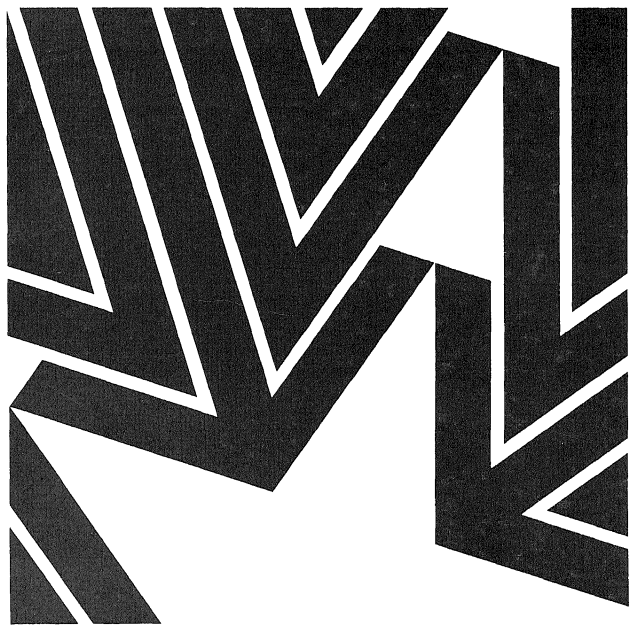




Energy Abstracts for Policy Analysis

A Current Awareness Journal



Technical Information Center
U. S. Department of Energy

To provide complete coverage of literature related to major Department programs, announcement publications which are comprehensive in their coverage of certain energy fields are issued regularly. All information in these

publications, plus additional backup information, is included in the energy data base of the Technical Information Center; all references are also available for machine searching via the

on-line retrieval system, DOE/RECON. Descriptions of these current awareness publications, which are supported either directly or indirectly by the DOE, appear below.

PUBLICATIONS OF THE TECHNICAL INFORMATION CENTER

Energy Abstracts for Policy Analysis (EAPA)

A monthly abstract journal devoted to the analysis of energy research, conservation, and policy. Scope and coverage are limited to substantive articles or reports and emphasize the following: programmatic efforts; legislative, regulatory, and other legal aspects; social, economic, and environmental impacts; regional and sectoral analyses; institutional factors, etc. *EAPA* is available from the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402; domestic subscribers \$4.00, foreign \$5.00 per copy; annual cumulative index, domestic \$6.00, foreign \$7.50 per copy. The annual subscription price is \$44.00 for domestic subscribers and \$55.00 for foreign subscribers.

Energy Research Abstracts (ERA)

A comprehensive semimonthly abstract journal devoted to all areas of energy-related information produced by the Department of Energy, other U. S. government organizations, and foreign governments. Indexes are cumulated semiannually and annually. *ERA* is available to the public on a subscription basis from the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402. The subscription rate for the 24 semimonthly issues including a semiannual index and an annual index is \$184.00 for domestic subscribers and \$230.00 for foreign subscribers. The semiannual and annual indexes will also be available separately to subscribers. The cost for the semiannual index is \$18.00 (domestic) or \$22.50 (foreign); the annual index is \$33.00 (domestic) or \$41.25 (foreign). A single issue costs \$5.55 (domestic) or \$6.95 (foreign).

The following publications are available to the public on a subscription basis from the National Technical Information Service (NTIS), Springfield, Virginia 22161. The annual subscription rate for one volume (calendar) year (12 issues plus cumulative index) is \$45.00 for domestic subscribers and \$90.00 for subscribers outside the North American Continent. A single issue is \$6.00 (domestic) and \$12.00 (outside the North American Continent).

Current Energy Patents (CEP)

A monthly publication providing abstracting and indexing coverage of the international patent literature, including patent applications, that concerns any aspect of energy production, conservation, and utilization. Available as PB81-902800.

Energy Conservation Update (ECU)

A monthly abstract journal devoted to current information on energy conservation in buildings, transportation and propulsion, and industry; waste processing plants and equipment; energy storage; energy conversion; advanced automotive systems; combustion systems; power cycles; synthetic fuels; and power transmission. Available as PB81-914800.

Energy and the Environment (EAE)

A monthly abstract journal devoted to information on the impacts of energy-related activities and radioactive and nonradioactive pollutants on the environment. Available as PB81-914900.

Fossil Energy Update (FEU)

A monthly abstract journal devoted to information on the processing and use of fossil fuels. Available as PB81-914600.

Fusion Energy Update (CFU)

A monthly abstract journal devoted to information on controlled thermonuclear research. Available as PB81-915300.

Geothermal Energy Update (GEU)

A monthly abstract journal devoted to information on the exploration and develop-

ment of geothermal resources. Available as PB81-914700.

Solar Energy Update (SEU)

A monthly abstract journal devoted to information on the utilization of solar, tidal, and wind energy. Available as PB81-914500.

Synthetic Fuels Update (SFU)

A monthly abstract journal devoted to information on coal gasification; coal liquefaction; other coal processing; biomass conversion to fuel; shale oil and tar sand bitumen production; hydrogen fuels; other hydrocarbon fuels; alcohol fuels; and inorganic hydrogen compound fuels. Available as PB81-902700.

INTERNATIONAL ENERGY PUBLICATIONS

Atomindex (Published in cooperation with the Technical Information Center by the International Atomic Energy Agency, International Nuclear Information System, Vienna, Austria)

A semimonthly abstract journal devoted to information on nuclear science and technology. Through an exchange agreement, IAEA/INIS provides all non-U. S. nuclear information of *Atomindex* to TIC for inclusion in the DOE/RECON Data Base; in turn, TIC provides all U. S. nuclear information to IAEA/INIS for inclusion in *Atomindex*. *Atomindex* is available

by subscription from UNIPUB, 345 Park Avenue South, New York, NY 10010. The cost of an annual subscription, 24 semimonthly issues and semiannual and annual cumulative indexes, is \$290.

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A monthly abstract journal devoted to information on coal. Through an exchange

agreement, IEA Coal Research provides all non-U. S. coal information of *Coal Abstracts* to TIC for inclusion in the DOE/RECON Data Base; in turn, TIC provides all U. S. coal information to IEA Coal Research for inclusion in *Coal Abstracts*. *Coal Abstracts* is available to Department of Energy components and contractors from the Technical Information Center. Non-DOE organizations may obtain *Coal Abstracts* from IEA Coal Research, Technical Information Service, 14-15 Lower Grosvenor Place, London SW1W 0EX, England, for 100 pounds sterling per year.



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UNITED STATES DEPARTMENT OF ENERGY

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Editor

ENERGY ABSTRACTS FOR POLICY ANALYSIS

ABOUT *ENERGY ABSTRACTS FOR POLICY ANALYSIS*

Energy Abstracts for Policy Analysis (EAPA), while embracing all phases of energy analysis and development, is limited primarily to nontechnological or quasitechnological articles or reports having significant reference value. This selectivity in scope and coverage of *EAPA* is effected to emphasize the following: programmatic efforts; policy, legislative, and regulatory aspects; social, economic, and environmental impacts; regional and sectoral analyses, institutional factors, etc. *Note:* the "hard" scientific and technical literature is abstracted for the most part in DOE *Energy Research Abstracts (ERA)* and is included in the DOE Energy Data Base.

Selection for *EAPA* is based strictly on content (substantive articles) and is made from Congressional committee prints; Federal agency and department reports; regional commission and state and local government reports; periodicals, including trade journals and newsweeklies; conference proceedings and/or conference papers; books, including manuals, directories, encyclopedias, etc.; and documents from industrial firms, private institutes and foundations, educational institutions, societies, associations, etc.

EAPA is available on an exchange basis to universities, research institutions, industrial firms, and publishers of energy information. Federal, state, and municipal agencies concerned with energy development, conservation, and usage may obtain *EAPA* free of charge. Inquiries should be directed to the Technical Information Center, P. O. Box 62, Oak Ridge, Tennessee 37830.

EAPA is available to the public on a subscription basis from the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402. The subscription rate for the 12 monthly issues plus the annual index is \$44.00 for domestic subscribers and \$55.00 for subscribers outside the North American Continent. The annual index is also available separately to subscribers for \$6.00 (domestic) or \$7.50 (outside the North American Continent). A single issue costs \$4.00 (domestic) or \$5.00 (outside the North American Continent).

ABSTRACTS IN ENERGY ABSTRACTS FOR POLICY ANALYSIS

The principal elements of abstract entries for a typical research and development report and a typical technical journal article are illustrated below.

Report number	Contract number	Availability
Date of publication	Author(s)	Title
Corporate		
2224	(ANL/EES-TM-75)	Assessment of the relative socioeconomic effects of increased coal development in the United States ¹ Stenehjem, E.J.; Santini, D.J. (Argonne National Lab., IL (USA)). Dec 1979. Contract W-31-109-ENG-38. 72p. Dep. NTIS, PC A04/MF A01.
This report contains a description of the Social and Economic Assessment Model, which is used to analyze the social and economic effects of energy development at the regional and county levels. Using the SEAM, the effects of coal mines and coal-fired utilities projected for over 340 US counties are examined. The study utilizes a clustering algorithm to determine the assimilative capacity of a county, that is, the county's ability to sustain the effects of an influx of population and thus an increased demand on its resources. The results of the clustering algorithm are used, together with county demographic data, as well as data on projected facility location, size, timing, and type, to estimate socioeconomic effects in terms of public costs that will be imposed on the affected populations.		

Author(s)	Title	Date of publication
Journal citation		
1864	ORNL residential energy-use model: structure and results. Hirst, E.; Carney, J. (Oak Ridge National Lab., TN). Contract W-7405-ENG-26. <i>Land Econ.</i> ; 55: No. 3, 319-333 (Aug 1979).	
The Residential Energy-Use Model at the Oak Ridge National Laboratory is used to analyze the effects of various conservation policies and techniques on costs and uses over time. Four fuels, eight end uses, and three housing types provide inputs to a simulation of national annual energy use. Each component is further subdivided and analyzed to make the model sensitive to demographic, economic, and technological factors and to show the effects of different energy-conservation options. 31 references.		

INDEXES TO ENERGY ABSTRACTS FOR POLICY ANALYSIS

Four indexes are provided for approaching the contents of each issue of *Energy Abstracts for Policy Analysis (EAPA)*. These indexes are cumulated annually. Each index is preceded by an introduction that details the organization of the index and the principles by which it was compiled. The reader is referred to these introductions for information not found in the index examples that follow.

•Corporate Index

Technical report literature is indexed using the name of the organization or institution responsible for the issuance of the report.

Argonne National Lab., IL (USA)

Analysis of brokerage feasibility for unit-coal-train shipments to the Midwest, 6:2225 (CONF-800128-1).

Assessment of the relative socioeconomic effects of increased coal development in the United States, 6:2224 (ANL/EES-TM-75)

•Author Index

Each author's name is indexed in the form appearing on the document abstracted, with the exception that given names are reduced to initials:

Carney, J., See Hirst, E., 6:1864

Hirst, E., ORNL residential energy-use model: structure and results, 6:1864

Santini, D.J., See Stenehjem, E.J., 6:2224

Stenehjem, E.J., Assessment of the relative socioeconomic effects of increased coal development in the United States, 6:2224 (ANL/EES-TM-75)

•Subject Index

The subject index consisting of entries naming specific materials, objects, and processes is arranged alphabetically. Document titles, informative phrases, or both, specific to these entries are arranged alphabetically under the entries.

COAL INDUSTRY/SOCIO-ECONOMIC FACTORS

Assessment of the relative socioeconomic effects of increased coal development in the United States, 6:2224 (ANL/EES-TM-75)

ENERGY MODELS

ORNL residential energy-use model: structure and results (Effects of different conservation options), 6:1864

ENERGY SOURCE DEVELOPMENT/ECONOMIC IMPACT

Assessment of the relative socioeconomic effects of increased coal development in the United States, 6:2224 (ANL/EES-TM-75)

•Report Number Index

Technical report literature is also indexed using report numbers. This index includes information on where individual reports may be obtained. While not reports, patents and conference papers are indexed here as a matter of convenience.

ANL/CNSV-TM-

29

6:2124

Dep. NTIS, PC A15/MF A01

30

6:2107

Dep. NTIS, PC A05/MF A01

ANL/EES-TM-

75

6:2224

Dep. NTIS, PC A04/MF A01

SUBJECT CONTENTS (NUMERICAL LISTING)

Six-digit subject category numbers are used in the storage, retrieval, and manipulation of bibliographic information entered into DOE's computerized bibliographic information system. The six-digit category numbers are utilized as if they were three pairs of two-digit numbers, the first two pairs being used to arrange the abstract content of *Energy Abstracts for Policy Analysis*. Because each issue of *EAPA* announces only those documents becoming available during a monthly period, some subject categories may not be represented in every issue.

29 GENERAL

- 01 Energy Analysis and Modeling
(*Methodology or techniques for process analysis, input-output analysis, systems analysis, regional analysis, etc., including energy accounting and net energy evaluations. For analysis for a specific purpose, see the appropriate subcategory; e.g., for forecasting electric power demand, see the subcategory Electric Power.*)
- 02 Economics and Sociology
(*All economic, sociological, or political aspects of any energy action or policy, e.g., energy source development, energy facility construction and/or siting, implementation of conservation or other programs, the OPEC cartel, etc., also, basic economic and social studies that are applicable to analysis of energy systems or policy.*)
- 03 Environment, Health, and Safety
(*Policy and management aspects as opposed to technological studies; energy or monetary costs of complying with regulations; environmental impacts of energy source development, energy facility construction, and/or siting, conventional energy supplies, etc.; environmental regulations and legislation per se.*)
- 04 Natural Resources
(*Broad survey-type or economics-oriented studies related to resource development or utilization; includes ores, minerals, and materials generally, but not specifically, unless an element of unusual interest, e.g., uranium; also includes general studies on water resources, land use, food production, and resource conservation.*)
- 05 Research, Development, Demonstration, and Commercialization
(*Overall energy RD&D programs of Federal, state, or local governments or organizations; industrial laboratories; regional organizations; private institutions; and foreign governments and organizations. Technology assessment, transfer, and utilization are also included here.*)
- 06 Nuclear Energy
(*Only the broader nontechnological aspects of nuclear energy as related to overall energy policy or strategy.*)
- 07 Transport and Storage
(*ENERGY TRANSPORT or ENERGY STORAGE, not energy aspects of transportation or energy supply stockpiling or storage.*)
- 08 Waste Heat Utilization
(*Total energy systems, co-generation, district heating and cooling, or any other use of waste heat.*)

- 10 Conservation
(*Policy, management, legislative, programmatic, and regulatory aspects of conservation.*)
- 20 Supply, Demand, and Forecasting
(*Surveys, analyses, simulations, forecasts, and forecasting techniques for predicting energy demand or supply; also, emergency measures, e.g., allocations, substitutions, etc., to ensure adequate supplies.*)
- 30 Policy, Legislation, and Regulation
(*Congressional hearings, legislation, regulations, etc., for implementing or interpreting already-established policy or that can aid in formulating policy; also, assessments, evaluations, surveys, regional hearings, etc., on present or to-be-established policies. Information concerning energy policies of state, local, and foreign governments or regional or international organizations is also included.*)
- 40 Fossil Fuels
(*Policies and programs for and economic, sociological, and environmental aspects of coal, petroleum, natural gas, and oil shale or tar sand development; also, all assessments of reserves and resources, both U.S. and worldwide.*)
- 50 Hydrogen and Synthetic Fuels
(*Assessment of the potential of hydrogen in a hydrogen-based economy or of nonfossil fuel sources in substitution for conventional sources.*)
- 60 Electric Power
(*Surveys and forecasting of electricity demand and supply; statistics of power consumption on a local, regional, or national basis; utility management problems including planning, rate structures and regulations, accounting procedures, peak-load pricing, load management, power thefts, public relations, etc.*)
- 80 Consumption and Utilization
(*Survey- or statistical-type information on energy usage in the consuming sectors.*)
- 90 Unconventional Sources and Power Generation
(*Policy and management aspects of solar, geothermal, wind, tidal wave, or other renewable energy sources.*)

CORPORATE INDEX

AUTHOR INDEX

SUBJECT INDEX

REPORT NUMBER INDEX

SUBJECT CONTENTS (ALPHABETICAL LISTING)

Six-digit subject category numbers are used in the storage, retrieval, and manipulation of bibliographic information entered into DOE's computerized bibliographic information system. The six-digit category numbers are utilized as if they were three pairs of two-digit numbers, the first two pairs being used to arrange the abstract content of *Energy Abstracts for Policy Analysis*. Because each issue of *EAPA* announces only those documents becoming available during a monthly period, some subject categories may not be represented in every issue.

29 GENERAL

- 10 Conservation
- 80 Consumption and Utilization
- 02 Economics and Sociology
- 60 Electric Power
- 01 Energy Analysis and Modeling
- 03 Environment, Health, and Safety
- 40 Fossil Fuels
- 50 Hydrogen and Synthetic Fuels

- 04 Natural Resources
- 06 Nuclear Energy
- 30 Policy, Legislation, and Regulation
- 05 Research, Development, Demonstration,
and Commercialization
- 20 Supply, Demand, and Forecasting
- 07 Transport and Storage
- 90 Unconventional Sources and Power Generation
- 08 Waste Heat Utilization

CORPORATE INDEX

AUTHOR INDEX

SUBJECT INDEX

REPORT NUMBER INDEX

ENERGY ABSTRACTS FOR POLICY ANALYSIS

29 GENERAL

5272 (DOE/EIA/10752—T2) Analytical and policy issues in energy economics: selected bibliography. (Charles River Associates, Inc., Boston, MA (USA)). 1981. Contract AC01-81E110752. 15p. NTIS, PC A02/MF A01. Order Number DE81026208.

Subjects include general readings, petroleum issues, vertical integration, diversification, coal, uranium, and special energy topics such as taxes, competition, deregulation and energy security. (GHT)

5273 CCE energy statement and its application to Pennsylvania. Cantieri, W.F. pp 67-79 of Proceedings of second annual energy seminar. Erie, PA; Gannon University (1980). From 2. annual energy seminar; Erie, PA, USA (31 Mar 1980).

The Coordinating Committee on Energy (CCE), composed of 22 member societies, issued an energy statement in 1976 that was thought to contain all the necessary elements for a good national policy. The statement concerns issues on conservation, solid fuels, oil and gas, shale oil, nuclear power, solar and other renewable sources, electric power, and long range planning. The statement is then analyzed and applied specifically to Pennsylvania. (MCW)

5274 (DOE/MA—0021) DOE Property Management Regulations. (USDOE Assistant Secretary for Management and Administration, Washington, DC). Aug 1981. 223p. NTIS, PC A10/MF A01. Order Number DE81029825.

Subchapters include: defense materials; supply and procurement; ADP and telecommunications; transportation and motor vehicles; utilization and disposal; and industrial plant equipment. (GHT)

5275 Higher prices or gasoline lines loom if Iran-Iraq war lasts into spring. Madison, C. *National Journal*; 13: No. 3, 99-101(17 Jan 1981).

Policies for dealing with the gasoline shortage caused by the Iran-Iraq war are predicted. Options for allocations of existing supplies are discussed. (PSB)

5276 Comparative study of the impacts of Energy and Man's Environment upon fifth-grade students. Thompson, J.R. Laramie, WY; Univ. of Wyoming (1980). 190p. University Microfilms Order No. 81-11,614.

Thesis (Ph. D.).

The primary purpose of this study was to determine the effects of Energy and Man's Environment (EME), a non-profit energy education organization, on fifth-grade students in two areas of the United States. In addition, the study was designed to determine if differences in student's performance on a test of energy literacy existed between two states where the EME program has been conducted and if females and males performed differently on a test energy literacy. The research instrument was validated and reliability was established in a previous study. The instrument included items in the cognitive and affective domain and an integrity scale. The total score was the summation of the scores of the attitude and knowledge questions. The integrity scale was used to determine the honesty of responses to the attitude portion of the instrument. Students in Riverton, Wyoming, and Beaverton, Oregon were identified for the treatment group because their teachers had participated in an EME energy-education teacher-training program. Findings reveal that the EME program does have a significant impact on the energy literacy of students, and there is no difference specific state program. Further, females do score significantly higher on a test of energy literacy, but only on the total score. Dif-

ferences by subtests were not significant. Overall results indicate the EME is achieving its purpose of promoting energy literacy. Students from a community where EME programs have been conducted do achieve higher scores on a test of energy literacy than students residing in a similar non-EME community.

2901 Energy Analysis And Modeling

REFER ALSO TO CITATION(S) 5288, 5406, 5411, 5452, 5454, 5455

5277 (EPRI-EA—1956-Vol.2) Models for forecasting energy use in the US farm sector. Volume 2. Final report. Christensen, L.R. (Christensen (Laurits R.) Associates, Inc., Madison, WI (USA)). Jul 1981. 131p. NTIS, PC A07/MF A01.

Econometric models are developed and estimated for the purpose of forecasting electricity and petroleum demand in US agriculture. A structural approach is pursued which takes account of the fact that the quantity demanded of any one input is a decision made in conjunction with other input decisions. Seven different functional forms of varying degrees of complexity are specified for the structural cost function, which describes the cost of production as a function of the level of output and factor prices. Demand for materials (all purchased inputs) are derived from these models. A separate model breaks this demand up into demand for the four components of materials. This model is used to produce forecasts of electricity and petroleum in a stepwise manner. Five different functional forms are specified for this submodel. The seven functional forms of the basic model and the five functional forms of the submodel are evaluated, and preferred models selected. Forecasts are generated of the exogenous variables in the model using the Wharton annual forecasting model of the US economy. In order to make such forecasts a linkage model is developed, linking the variables of the Wharton model to the exogenous variables of the farm sector model. Forecasts from the Wharton model are fed into the linkage model to derive forecasts for the exogenous variables. The forecasts of the exogenous variables are fed into the farm sector model to derive forecasts for electricity and petroleum purchases. The different functional forms of the farm sector model are used to derive alternative estimates of energy purchases. These different estimates are compared and a preferred set of estimates chosen. These preferred forecasts show the quantity of electricity purchased growing at a rate of just over 6% between now and the year 2000 while the quantity of petroleum declines at a rate of over 4%.

5278 (LA-UR—81-2288) Ultimate in building energy analysis: DOE-2 and BLAST. Hunn, B.D. (Lawrence Livermore National Lab., CA (USA)). 1981. Contract W-7405-ENG-36. 33p. (CONF-8105107—1). NTIS, PC A03/MF A01. Order Number DE81028703.

From Symposium on energy and big building design; Philadelphia, PA, USA (25 May 1981).

Many building energy analysis tools, ranging from the simplest to the most sophisticated, are applicable to the design of large commercial buildings. This paper focuses on two of the sophisticated, detailed, and most powerful of these tools: the DOE-2 and BLAST computer programs. DOE-2 and BLAST are generally classed as high-level, computer-dynamic methods that are based on hour-by-hour computation. These tools are placed in the context of building energy analysis, and the motivation for their development is traced. The characteristics of DOE-2 and BLAST are discussed, with emphasis on their solar simulation features, and their capabilities are contrasted and related. Three case studies, illustrating typical applications of the programs to the retrofit of existing buildings and the design of new buildings, are presented: a passive solar retrofit of an office building, the use of DOE-2 as a predesign analysis

tool, and the use of BLAST in a research and development application. Future directions in research and development needs for high-level building energy analysis tools and the progress being made toward increased use of these tools are discussed.

5279 (P-101-80-008) California energy demand 1980 to 2000: revised forecast for consideration in the proceedings on the Third Biennial report. Volume I. Technical report. (California Energy Resources Conservation and Development Commission, Sacramento (USA)). Nov 1980. 380p. California Energy Commission, Sacramento, CA. Order Number DE81903658.

This report, in a final revised edition, presents the staff forecasts of electricity and natural gas demand for consideration in the proceedings leading to the Third Biennial Report. It contains revised forecasts prepared subsequent to issuance of the preliminary staff forecast of June 3, 1980, including major sections devoted to input assumptions, conservation savings, final forecast results, detailed end-use and industry results by service area, and complete methodological description of all model changes since preparation of complete documentation in October 1979. The report is intended to be a detailed description of input assumptions, conservation analysis, and results which can, in conjunction with the October 1979 Technical Documentation, be used by technical researchers to analyze the complex models used by the CEC staff for forecasting electricity and natural gas demand. This edition documents the final staff demand forecast of September 22, 1980, which corrected several computational errors contained in the original document.

5280 National energy balance. Rio de Janeiro, Brasil; Federative Republic of Brazil (1980). 106p. (NP-1903961).

Subjects addressed are: excerpts relating to energy from speeches by Brazilian President and Minister of Mines and Energy; Brazilian energy policy; and energy balance among primary energy consumption, Brazilian energy reserves and resources, imported energy, hydro power, coal, firewood, cane bagasse and charcoal, natural gas, alcohol, nuclear energy, new sources, oil shale, and petroleum. Additional tables cover electric power production, installed capacity and production forecast for hydroelectric, thermal and nuclear power. Consumption of petroleum products is given for energy and non-energy usage. Specific gravity and heat content tables are appended. (PSB)

5281 (UCRL-86543) Ridesharing and the database management system. Taasevigen, D. (Lawrence Livermore National Lab., CA (USA)). Aug 1981. Contract W-7405-ENG-48. 14p. NTIS, PC A02/MF A01. Order Number DE81028651.

Lawrence Livermore National Laboratory has operated a ridesharing program since 1977. As the volume of recordkeeping and information tracking for the program became more extensive, the need for an easily altered and operated database system became apparent. The following report describes the needs of the ridesharing program and how our database management system answers those needs.

5282 Exergy economics. Gaggioli, R.A.; Wepfer, W.J. (Marquette Univ., Milwaukee, Wis.). *Energy (Oxford)* ; 5: No. 8-9, 823-837 (Aug-Sep 1980).

Exergy accounting is important in a variety of applications, one of which is the proper costing of different utilities supplied as products either to outside consumers or to in-plant manufacturing processes from a common system. Other applications rely not only on the costs of products, but also on the cost of "energy" at the junctures between the various operations in a "process" or "energy-conversion" facility. These costs can then be applied to: (a) engineering/economic decisions regarding the operation (and maintenance) of a system or system-component, (b) feasibility studies, (c) improvement of design concepts and comparison of alternatives, (d) optimal design, and (e) economic selection of system components at the system design stage or time or replacement or retrofit decision. These different applications are illustrated by the results of four case studies. A discussion of the paper is appended. 20 refs.

5283 Second-law analysis: an alternative indicator of system efficiency. Hevert, H.W.; Hevert, S.C. (R and D Associates, Arlington, Va.). *Energy (Oxford)* ; 5: No. 8-9, 865-873 (Aug-Sep 1980).

Second-law analysis allows attribution of losses to design and operating parameters. For example, reducing irreversibility implies larger units of equipment for the same overall heat flow at lower thermal gradients. This introduces tradeoffs between equipment costs and operating costs. First-law efficiency does not provide enough information to support a comprehensive conservation ethic. Because it measures quantities of work and energy and ignores the quality of energy use, it can tell how much energy is needed to perform a particular task, but not how well that energy is used. Second-law analysis goes beyond allocation, and provides insights needed to apply energy resources to uses that produce less entropy per unit of useful heat or work. The authors review extant second-law analyses of energy-conversion components and cycles, and provide some original comparative analyses. These comparisons form the basis for conclusions which augment the traditional first-law measure of efficiency by second-law analysis. A discussion of the paper is appended. 11 refs.

5284 Energy: elusive solutions. Velocci, T. *Nation's Business* ; 68: No. 8, 22-26, 28 (Aug 1980).

The author states that America's seven-year search for answers to the energy crisis has produced more promise than substance. In fact, the US is even more dependent on imported oil today than it was in 1973 when the Arabs slapped on their economy-busting embargo. US imports have risen from 35% then to 40% now of daily oil consumption. The price of a barrel has doubled since last year and US product is sagging. Synthetic fuels from oil shale and coal deposits and conservation are still seen as the only solution to US independence from OPEC nations. (PSB)

5285 On the concept of standard energy. Kameyama, H.; Yoshida, K. (Univ. of Tokyo, Bunkyo-ku, Japan). *Energy Developments in Japan* ; 3: No. 1, 41-49 (Jul 1980).

The availability of exergy analysis based on the second law of thermodynamics is usually applied as a means of evaluating the efficiency of heating processes, where the thermal energy plays a dominant role. In the analysis of many processes such as chemical or electrical processes, the maximum work of other forms of energy, e.g., electrical, mechanical, and various materials must be evaluated. A concept of standard exergy for most of the chemical elements and compounds is proposed. As the standard state, environmental conditions were first defined, and then the values were calculated by following a guiding principle. The standard exergy chart is given and some examples are shown to illustrate the technique.

5286 Rising energy prices: what's good for some states is bad for others. Corrigan, R.; Stanfield, R.L. *National Journal* ; 12: No. 12, 468-474 (22 Mar 1980).

Data are compiled for ranking the fifty US states by energy sufficiency; only 12 states produce more than they use. Statistics are also reviewed by electricity producers, coal producers, oil producers, and industrial consumers. Economic impacts on production, pollution and prices are discussed as well as sociological impacts on human services from state-imposed severance taxes. Federal assistance programs are forecasted to feel the impact of these windfall taxes which are so unevenly distributed. The remaining states see aggressive energy conservation as their ticket for competition. (PSB)

5287 Simultaneous-equation analysis of the structure and performance of the United States petroleum-refining industry. Gabel, H.L. (Univ. of Virginia, Charlottesville). *Journal of Industrial Economics* ; 28: No. 1, 89-104 (Sep 1979).

This paper specifies a dynamic simultaneous equation model of industrial structure and performance, which is then estimated using ordinary least-squares (OLS), two-stage least-squares (2SLS), and three-stage least-squares (3SLS) regression techniques. A comparison of consistent 2SLS and 3SLS estimates with biased and inconsistent OLS estimates is used to evaluate the magnitude and direction of the simultaneous equation bias. Total derivatives are cal-

culated and their signs evaluated, and a specific comparison is then made between partial and total derivatives. Section II presents methodology outline; section III the model; section IV the empirical results and their analysis; and section V discusses the conclusions. 37 references. (PSB)

2902 Economics And Sociology

REFER ALSO TO CITATION(S) 5282, 5328, 5336, 5347, 5359, 5360, 5369, 5376, 5378, 5388, 5391, 5442, 5443, 5447, 5448, 5471, 5472, 5473, 5474, 5475, 5481, 5482, 5494, 5495, 5500, 5507, 5519, 5522, 5531, 5544, 5545, 5546, 5547, 5548, 5549, 5554, 5555, 5573, 5611, 5630, 5636, 5664, 5680

5288 (BNL—29747) Modelling energy-economic interactions in developing countries: a linear-programming approach. Meier, P.; Mubayi, V. (Brookhaven National Lab., Upton, NY (USA)). 1981. Contract AC02-76CH00016. 51p. (CONF-810726—2). NTIS, PC A04/MF A01. Order Number DE81026048.

From 9. international conference on operational research; Hamburg, F.R. Germany (23 Jul 1981).

This paper describes a new BNL energy-economic assessment model for application to energy assessments in developing countries. The shortcomings of previous BNL models to assess energy in developing countries are discarded. Emphasis of the new model is on a simple, comprehensive treatment of the energy sector; the enormous end-use sector detail of BESOM is discarded but, on the other hand, previously absent detail in the petroleum-product sector is added. The input-output model is directly incorporated in the Energy system LP as a set of additional constraints, as are some generic industry-process models that capture important technological options in the major energy-using industries (such as steel and cement) where fuel-substitution opportunities are significant from an overall national perspective. Finally, the major supply sectors, as well as the major energy-using industries, are modelled as capacity-expansion problems, in which explicit distinction is made between capital stock and energy flows. Objections are two-fold. First, the huge data requirements preclude meaningful analysis: even if it were possible, say, to estimate non-linear cost functions (one of the putative benefits of network traversal algorithms being the ability to handle almost any functional specification) the degree of precision may be entirely spurious. Second, and more importantly, for most developing countries the notion of energy supply curves is far-fetched, since energy prices are set by planning authority, not established by market clearing equilibrium. To be sure, such models will yield that equilibrium prices should be: but these can just as easily be established from the shadow prices of a more simple linear program.

5289 (BNL—29881) Project impact analysis as an optimal control problem. Anandalingam, G. (Brookhaven National Lab., Upton, NY (USA)). 1981. Contract AC02-76CH00016. 43p. (CONF-810542—5). NTIS, PC A03/MF A01. Order Number DE81028465.

From Joint meeting of the Institute of Management Sciences and Operations Research Society; Toronto, Canada (6 May 1981).

This paper analyzes the effects of a major investment project on a multi-sector less developed economy. Single investment projects with external effects reaching across the entire economy are frequently encountered in developing countries. This study concentrates on the Mahaweli Ganga Development Project in Sri Lanka, a multi-dam irrigation and hydroelectric power project. The Mahaweli Project calls for an annual investment level, in 1970 prices, of Rs 2200 million (US \$150 million) over a period of six years, which is 50 percent of the annual expenditure of the government. The project would thus require a large fraction of total investment over a medium term planning period and would materially alter the existing supply and demand for major goods and services. The project is sufficiently large that its effect is economy-wide. The model we use is a dynamic input-output optimizing model having the mathematical structure of an Optimal Control problem.

5290 (CONF-800820—13) Business performance and vertical integration. Maddigan, R.J. (Oak Ridge National Lab., TN (USA)). 1980. Contract W-7405-ENG-26. 28p. NTIS, PC A02/MF A01. Order Number DE81028531.

From American Statistical Society meeting; Houston, TX, USA (11 Aug 1980).

The focus of this empirical study is the relationship between vertical integration, as an element of market structure, and the price-cost margin, as a component of a firm's performance. The models presented in this paper differ from previous efforts because vertical integration is measured by the Vertical Industry Connections (VIC) index. VIC is defined as a function of the relative net interactions among the industries in which a firm operates. The results indicate that VIC is significant in increasing the price-cost margin, supporting the hypothesis that vertical integration can be employed as a strategy to enhance business performance.

5291 Recapture of intangible drilling and development costs: a discussion of the proposed regulations. Roe, S. L. (Deloitte Haskins & Sells, Houston, TX). *Oil and Gas Tax Quarterly*; 29: No. 4, 621-637 (Jun 1981).

Controversy over proposed Internal Revenue Service (IRS) regulations for Section 1254 of the Tax Reform Act of 1976 stem from a difference in interpretation. Comparisons of the new rules with current industry practices cover taxes on the income from recapture, the definition of terms related to the costs of drilling both productive and nonproductive geothermal wells, partnerships and partial interests, installment sales, and the exceptions and other adjustment rules. Congressional action may be necessary to resolve some of the technical differences outlined. Tax practitioners and taxpayers must determine, in the meantime, whether to comply with the proposed regulations even though they conflict with Section 1254 and with congressional intent. (DCK)

5292 Multinational corporations and Third World capitalism. Ulmer, M.J. (Univ. of Maryland, College Park). *Journal of Economic Issues*; 14: No. 2, 453-471 (Jun 1980).

The principal conclusion of this article is that the direct investments of US multinationals have had a powerfully benign effect on Third World countries, promoting extraordinarily high rates of economic growth wherever they were allowed to do so. Of course, internal policies in the poorer countries help to determine how fast and how widely prosperity is dispersed and shared throughout their populations. But the significant fact is that foreign direct investment has been critical in creating large increases in per capita output, and without that it would be only the poverty that could be shared. A related conclusion suggested by this analysis is that foreign direct investment has been a far more important promoter of growth than has foreign economic aid. To be sure, some forms of aid were not meant to promote economic expansion, but simply humanitarian relief from hunger or disease. Even so, much aid has been explicitly intended to stimulate development, and sometimes with considerable fanfare. Investment is more effective than aid in another strategic respect. The former actively encourages capitalist enterprise, both directly and indirectly. It does so by example, and through enlisting a portion of the local population in its activities. It does so, also, through the higher incomes it generates for consumers and the business it activates among local suppliers, processors, and others.

5293 Toward a service-oriented growth strategy. Baer, W. (Univ. of Illinois, Urbana); Samuelson, L. *World Development*; 9: No. 6, 499-514 (Jun 1981).

This article suggests that the linkage between industrial modernization and significant service-sector employment gains has not been adequately considered and that such consideration might lead to a re-evaluation of the labor-absorption argument, which calls for more appropriate technologies with higher labor intensity. This paper reviews the literature on labor absorption and appropriate technology. It then examines the experience of the service sector in both developing countries (DCs) and less-developed countries (LDCs). The key relationships between the service sector and the economy are then developed, leading up to possible implications for LDC growth strategies. 50 references, 10 tables.

5294 Energy use and social structure in a Bangladesh village. Briscoe, J. *Population and Development Review*; 5: No. 4, 615-641 (Dec 1979).

This paper examines energy availability and patterns of energy use in the context of a single village in rural Bangladesh. From a quantification of the average daily flows of energy use by

the study population in the village, the analysis proceeds to an examination of patterns of land ownership and of the relations governing transactions between members of different classes in land, labor, and crop residues. The final section assesses the likely effects of energy and rural development projects on different classes in the village. (PSB)

5295 Auto: a prosperous past...a dubious future. Samuelson, R.J. *National Journal* ; 12: No. 11, 424-437(15 Mar 1980).

Political decisions on the future of the automobile are intricately intertwined with US and world economy, highway safety, air quality, health considerations and energy shortages. Added to this list is an American tenacity of preserving their instant lifestyle that the auto symbolizes. These factors are all reviewed with a prediction that the automobile will remain a part of the American scene for a long time. (PSB)

5296 (MIT-EL-81-009) User's guide to the Venezuelan macrofinancial model. Aliana, S.; McDonald, D. (Massachusetts Inst. of Tech., Cambridge (USA). Energy Lab.). Apr 1981. Contract AM01-76E102295. 45p. NTIS, PC A03/MF A01. Order Number DE81029726.

This paper presents a user's guide and documentation for a macrofinancial model of Venezuela. This working paper presents the technical aspects of the simulation model and the data developed to support the model. The model is described in Section 2, which includes all of the equations of the model, possible uses of the simulation structure, and detailed instructions on how to actually run the model on TROLL. Section 3 contains the time series data developed for this study. Both the derivation of the data and a guide to their datafile storage on TROLL are included.

5297 (NP-22596, pp 521-531) Microeconomic decision-making in an unstable macroeconomic environment. Stalon, C.G. (Illinois Commerce Commission, Springfield). 21 Oct 1980. EPRI, Palo Alto, CA.

From Rate design study regional conference; San Francisco, CA, USA (May 1980).

The present recession in the US (1980) is discussed; especially discussed are the concerns about the consequences about the next recovery. The purpose of the recession and accomplishing that purpose are addressed. Some problems which have been created and will be created for business in general and for utilities and their regulators are discussed. The inflation-unemployment trade-off and creation of the tradeoff are discussed. In commenting on the economy, the author charges that we as a nation have slipped into the practice of reconciliating economic conflict in a destructive manner. It is recommended that if the social destructiveness of the inflation-unemployment trade-off is to be reduced, the political and economic processes which have led to the present dilemma must be understood and controlled. (MCW)

5298 (PB-81-123572) Metal coil surface coating industry - background information for proposed standards. Final report. (Environmental Protection Agency, Research Triangle Park, NC (USA). Office of Air Quality Planning and Standards). Oct 1980. Contract EPA-68-02-3056. 216p. NTIS, PC A10/MF A01.

This document contains information used as the basis for developing proposed New Source Performance Standards for the metal coil surface coating industry. The document includes an industry description, descriptions of model plants and regulatory alternatives considered, and environmental, energy, and economic impact analyses of the regulatory alternatives.

5299 (PB-81-124810) Public involvement manual: involving the public in water and power resources decisions. Creighton, J.L. (Creighton and Creighton, Saratoga, CA (USA)). Jun 1980. Contract DI-8-07-83-V0709. 334p. NTIS, PC A15/MF A01.

The Public Involvement Manual presents standards, instructions, and techniques for planning, implementing, and reporting public involvement programs. The manual is applicable to public involvement in the planning of large and small scale projects and programs that will significantly affect the public, and is specifically applicable to public involvement in water resources planning.

5300 (UMTA-R1-06-0007-80-1) Life-cycle costing for procurement of small buses. Winslow, B.; Morrow, R.; Carbone, R.; Cross, E. (Gill Associates, Inc., Washington, DC (USA)). Aug 1980. 80p. NTIS. Order Number DE81903589.

Life-cycle costing is a technique for objectively incorporating the costs of ownership of equipment in the procurement selection process. It is an accepted alternative to low initial price for selection of transit rolling stock. To be used in procurement, the evaluation procedure must be described in the bidders' information and the procedure and data used must be based on the established relationship to the costs of owning and operating the equipment. Forecasts of future costs for maintenance and fuel may be based on experience obtained either in a testing program or final normal revenue service operation. Realistic assessments of future operating environment and requirements, and consistent applications of procedures and cost parameters, tend to minimize the risk that errors in estimates of future costs will result in an incorrect selection. Use of life-cycle costing reduces the probability that low-priced, but inappropriate, vehicles will be selected for transit service and encourages vendors to incorporate cost-effective improvements in tendered vehicles.

5301 Comparative economics of basic industries in the Arabian Gulf region. Al Khalaf, A.A.R. *OPEC (Organization of Arab Petroleum Exporting Countries) News Bulletin* ; 7: No. 7, 5-15(Jul 1981).

In Arabian Gulf industrial development, location factors show a favorable decline compared to the US as a result of industrial experience and the development of a data base on which to base comparisons. Petrochemical feedstocks and capital are the major resources for the Arabian states' investments. Cost analyses of ammonia, ethylene, and methanol show that production is only a little more than half the US production costs. While ethylene derivatives lose their economic advantage, they are more practical for marketing. Methanol production is developing slower than the production of ethylene derivatives because of competition in industrialized countries and low world prices for gas, but rising gas prices and the use of methanol for fuel are changing this situation. Comparisons of the growing aluminum industry with the investment and operating costs of other countries show that total operating costs are low, total costs per ton are average, and electricity costs as a percentage of total operating costs are significantly lower. New iron and steel technologies and lower energy costs will make these industries feasible for the Gulf states. 7 tables. (DCK)

5302 Taxation of United States investment in oil and gas exploration, development, and production in selected countries. Dworin, L. (Univ. of Texas, Austin). *Oil and Gas Tax Quarterly* ; 29: No. 4, 638-670(Jun 1981).

The tax and licensing systems utilized by several countries (including the US) are described, and the relative success of each of these systems as a mechanism for capturing the maximum share of the economic rent (the income after allowing for all factor costs, including a return to capital) is noted. The tax laws of these countries are then reexamined to see whether these payments would be creditable under the recently issued temporary (and proposed final) Treasury regulations (T.D. 7739). Results illustrate the basic dilemma faced by many foreign governments. If the host government seeks a system that uniformly captures almost all the economic rents attributable to its resources (such as Saudi Arabia), the income tax imposed is almost certain to be one that provides for a greater charge on those drilling for oil than on those engaged in other activities, and would thus be noncreditable under the temporary regulations. If, on the other hand, the host government modifies its tax and licensing system (as did Indonesia) so as to ensure creditability, the result is a system which overly taxes marginal fields and fails to capture the full benefits from the more-successful fields. This uneven treatment adds to the intrinsic variance in expected return, and thus increases the risk premium which a producer might require to drill in the country. 19 references, 1 figure, 8 tables.

5303 Influence of trade and commercial barriers on the industrial processing of natural resources. Yeats, A.J. (UNCTAD, Geneva, Switzerland). *World Development* ; 9: No. 5, 485-494(May 1981).

Claims that there is no evidence of trade and commercial barriers to the exports of developing countries are counter to the

opinion of international policymaking institutions. These claims are examined and traced to a misunderstanding of - or an unfamiliarity with - relevant data. The available evidence suggests that artificial trade restraints such as tariffs or non-tariff barriers (NTBs) are of major importance in agriculture as well as labor-intensive industries. In such sectors, maximum developing-country trade gains hinge on international cooperative action aimed at securing liberalization of these government-imposed measures. 26 references, 3 tables.

5304 Resource extraction by a monopolist with influence over the rate of return on non-resource assets. Hoel, M. *International Economic Review* ; 22: No. 1, 147-157 (Feb 1981).

OPEC is used to analyze optimal extraction of a finite resource stock by a monopolist whose resource extraction determines its rate of return on non-resource assets. Two functions are considered: the maximum criterion, which assumes the monopolist's objective is the highest-possible constant-consumption path, and the discounted utility of consumption, which assumes that the elasticity of the marginal utility of consumption is constant. The analysis concludes that, if the discounted utility is maximized and the utility discount is lower than the non-resource rate of return, there may be an increase in the level of extraction. Resource extraction will show a constant decline if the maximum criterion is used. Several ways to extend the model are suggested. 14 references. (DCK)

5305 Macroeconomic and social impacts of solar energy development. Nainis, W.S.; Berkowitz, J. (Arthur D. Little, Inc., Cambridge, MA). pp. 27.1-27.25 of Solar energy handbook. Kreider, J.E.; Kreith, F. (eds.). New York, NY; McGraw-Hill, Inc. (1981).

An impact analysis model is discussed which gauges the environmental and resource utilization impacts of various scenarios of growth for the application of solar technology in the heating and cooling of buildings. The various classes of input data required for operation of the model are discussed. Estimates of the impacts of both residential, single-family solar energy devices and large commercial/multiple dwelling unit devices are made.

5306 Microeconomics of solar energy. Ruegg, R.T.; Sav, G.T. (National Bureau of Standards, Washington, DC). pp. 28.1-28.42 of Solar energy handbook. Kreider, J.E.; Kreith, F. (eds.). New York, NY; McGraw-Hill, Inc. (1981).

Basic concepts and methods of economic analysis are presented, and their use is illustrated in sample problems. An overview is given of the basic steps in life-cycle cost analysis, discounting cash flows, considerations important in making assumptions, and methods of dealing with uncertainty and inflation. Major components of costs and savings associated with solar energy systems are described, including various types of system costs, energy costs and savings, taxes, and government incentives. A methodology for optimizing a solar energy system for maximum net savings is described. The basic concepts of optimization are set forth; an optimization analysis and an approach to optimization are described in detail. An example optimization problem is solved. (LEW)

5307 Alternative energy forms and the aged. Cambel, A.B.; Heffernan, G.A. (George Washington Univ., Washington, DC). *Energy (Oxford)* ; 5: No. 12, 1179-1182 (Dec 1980).

The U.S. aging population is increasing rapidly. Those "over 65" numbered 3.1 million in 1900, and by 1977 the total climbed to 23.5 million. This growing constituency is expected to produce substantial social, economic, and political influence over the period contemplated for development of alternative energy systems. It might appear, at first, that age does not play a role in how people demand energy. However, upon further examination, it becomes evident that there are reasons for differing energy demands between age groups. For example, because the aged generally live on fixed and limited incomes, it follows that their problems have a serious economic aspect. There are also special medical concerns, particularly those related to temperature and lighting, since the aged are particularly vulnerable to situations in which either of these is less than adequate. This paper discusses those aspects of aging and the nation's energy problem which are not related in everyday consideration of these as separable problems. 4 refs.

5308 Capacity strategies for the 1980s. Leone, R.A.; Meyer, J.R. *Harvard Business Review* ; 58: No. 6, 133-140 (Nov 1980).

The faltering competitiveness of American industry has now become a topic of broad national discussion. Out of that discussion has emerged a renewed awareness that sound production management is of crucial importance to our industrial health. In this article the authors take a careful look at one strategic production issue: the decision to add new plant capacity. Whether the costs of new capacity are rising or falling, identifiable strategies exist for making profitable long-term decisions. Properly understood, today's competitive environment offers abundant opportunities for success, not merely survival. The trouble comes when managers attempt to make decisions about additions to capacity without first checking to see if their strategic assumptions are appropriate to the present economic climate.

5309 Cost comparison of energy projects: discounted cash flow and revenue-requirement methods. Phung, D.L. (Oak Ridge Associated Universities, Tenn). *Energy (Oxford)* ; 5: No. 10, 1053-1072 (Oct 1980).

Both the discounted cash flow (DCF) and revenue requirement (RR) methods are frequently used in the cost analysis of energy projects. Each is especially well suited in special circumstances. For most forward-looking ventures, the RR method appears to be more useful. This paper provides simple formulations for the two methods and some special cases of interest for costing practices. Both formulations are applicable to either free or regulated enterprises and also under constant-dollars or inflationary conditions. The interpretation of cost results depends on the selection of cash-flow streams and/or the intent of revenue requirements. Several numerical examples are given. 23 refs.

5310 Next great depression II: the impending financial collapse. Fushfeld, D.R. (Univ. of Michigan, Ann Arbor). *Journal of Economic Issues* ; 14: No. 2, 493-503 (Jun 1980).

The author concludes that policies necessary for economic stability in the present situation, in which market rates of interest exceed real rate of return on capital, include the following: (1) increases in aggregate demand from expansionary fiscal and monetary policies sufficient to generate the necessary rate of inflation, that is, a rate of inflation equal to the difference between market interest rates and the real rate of return on capital; (2) in addition, escalating government expenditures and an increasing money supply are necessary to overcome the effects of rising costs, increased demand for liquid assets, and rising government revenues. These stabilization policies are the opposite of those derived from the conventional wisdom that stabilization during periods of inflation requires fiscal and monetary restraint. Those policies are derived from a theory that implicitly assumes equality of market rates of interest and the real rate of return on capital. That assumption accorded with reality a dozen years ago, but it no longer does. Reducing the rate of inflation below the level of inflation necessary to compensate business firms for increasing costs plus the difference between i and r threatens both immediate reductions in output and employment and the multiplied effect of reduced investment. Perhaps the greatest thing we have to fear is that the present policy initiatives will be successful.

5311 Mankind at the starting point. Brinkman, R.L. (Portland State Univ., OR). *Journal of Economic Issues* ; 14: No. 2, 567-582 (Jun 1980).

In this article a modified Veblen-Ayres framework analyzes the current controversy over the limits to growth. The issue concerns how to explain the apparent paradox of an exponential advance of technology and economic growth within the confines of a finite earth and fixed resource base. While the current crisis and conflict are real enough, the hypothesis presented here is that the cause is not to be found in finite resources, but in a malfunctioning sector of social organization. We will try to show, by analyzing the dynamics and resulting structure of economic growth and development, that resources are potentially unlimited. If such is the case, then Thorstein Veblen and Clarence Ayres were correct in diverting attention from natural resources and the biosphere and focusing it on the social structure as the primary problem area in the overall economic process.

5312 National Transportation Policy Study Commission and its final report: a review. Williams, E.W. Jr. (Columbia Univ., New York). *Transportation Journal* ; 19: No. 3, 5-19(Spr 1980).

Six major themes underlie the policy section of the report: (1) national transportation policy should be uniform; policies should not work at cross purposes; (2) there should be an overall reduction in federal involvement; in general, the public is best served by decentralized private decisionmaking that adapts transportation service closely to customer demands; (3) economic analysis of intended federal actions should be used; (4) when the transportation system is used to pursue non-transportation goals, this should be done in a cost-effective manner; (5) federal involvement in transportation safety and research is required; (6) users and those who benefit from federal actions should pay.

5313 Issues in indigenous research and development in Third World countries. James, D.D. (Univ. of Texas, El Paso); Street, J.H.; Jedlicka, A.D. *Social Science Quarterly* ; 60: No. 4, 588-603(Mar 1980).

This review of questions confronting Third World countries in deciding whether to launch domestic programs of research and development reveals that the issues are much more complex than conventional economic analysis would indicate. In one view, the motive for indigenous technological activity is simply another expression of economic autarchy at whatever cost; in another, it is a necessary effort to redress the growing imbalance in cultural development represented by the technology gap, which affects all Third World countries no matter what their political coloration.

5314 Refining the waterfront. Alternative energy facility siting policies for urban coastal areas. Morell, D.; Singer, G. (eds.). Cambridge, MA; Oelgeschlager, Gunn & Hain, Publishers, Inc. (1980). 355p.

Alternative energy facility siting policies for urban coastal areas are discussed with focal points on the older urban coastal areas, alternative patterns of development, economics of energy facility siting, and a look into the future for urban coastal areas. An appendix and bibliography is included in the work. (DLS)

5315 Coastal zone conflicts and urban opportunities. Morell, D.; Singer, G. pp 1-15 of *Refining the waterfront. Alternative energy facility siting policies for urban coastal areas.* Morell, D.; Singer, G. (eds.). Cambridge, MA; Oelgeschlager, Gunn & Hain, Publishers, Inc. (1980).

Energy and environmental policies constantly confront conflicting goals in pursuit of an amorphous national interest. Nowhere are these dilemmas more apparent than at the confluence of energy siting, coastal zone management, and urban development. Along the coast rural and urban interests often are in conflict. The research was focused on problems of siting energy facilities on city waterfronts or in alternative locations. The researchers tried to determine mechanisms for finding sites for necessary new energy facilities that are compatible with the conflicting mandates of rural coastline preservation and the changing uses of urban waterfronts. (DLS)

5316 People and petrochemicals: siting controversies on the urban waterfront. Singer, G. pp 19-63 of *Refining the waterfront. Alternative energy facility siting policies for urban coastal areas.* Morell, D.; Singer, G. (eds.). Cambridge, MA; Oelgeschlager, Gunn & Hain, Publishers, Inc. (1980).

With nearly every major city in the US located on navigable water and almost half of the US population living within 50 miles of a coast, urban coastal areas play a key role in national affairs. These prime waterfront locations in many cities are ripe for redevelopment. The rural preservationist focus of the federal coastal zone management act of 1972 and many state laws encourage urban siting for those energy and other facilities not wanted in unspoiled areas. Public reactions against waterfront siting are reviewed with emphasis on citizens groups against petrochemical sitings on urban waterfronts. (DLS)

5317 Urban waterfront: planning perspectives and energy facility siting. Denitz, P. pp 63-79 of *Refining the waterfront. Alternative energy facility siting policies for urban coastal areas.* Morell, D.; Singer, G. (eds.). Cambridge, MA; Oelgeschlager, Gunn & Hain, Publishers, Inc. (1980).

The emergence of energy self-sufficiency as national policy and major offshore explorations in the Baltimore Canyon, Georges Bank, and other new areas point to the likely need to locate major new onshore support activity. Critical issues of economic social, and aesthetic impact require coastal cities to determine exactly what constitutes the highest and best use of their waterfronts. Broader perspective was gained through an examination of the regional context of waterfront development in Hudson County, New Jersey. Special attention was paid to the attitudes of cities, the county, regional planning agencies, and various advisory boards and activist groups regarding the feasibility and acceptability of creating a regional strategy for waterfront planning. (DLS)

5318 Economics of permitting: an approach. pp 183-209 of *Refining the waterfront. Alternative energy facility siting policies for urban coastal areas.* Morell, D.; Singer, G. (eds.). Cambridge, MA; Oelgeschlager, Gunn & Hain, Publishers, Inc. (1980).

Different permit processes and locational scenarios have varying kinds of impacts on the economics of energy facility development. In the northeast US, energy facilities have encountered strong opposition from community organizations and environmental groups. Two issues are of principal importance in this analysis. One is the economic impact of the permitting process on the desirability of an investment in an energy on industrial facility. The other is the possible effects on the location selected for the facility on the permitting process and investment economics. The overall intent is to determine if the additional costs of innovative siting can be offset by reduced permitting costs. (DLS)

5319 Impacts of permitting delays on investment desirability. pp 211-231 of *Refining the waterfront. Alternative energy facility siting policies for urban coastal areas.* Morell, D.; Singer, G. (eds.). Cambridge, MA; Oelgeschlager, Gunn & Hain, Publishers, Inc. (1980).

This article examines the effect or delays resulting from the permitting process on the desirability of a proposed refinery investment. To measure the impacts of delays, cost and revenue data were obtained for a refinery producing 200,000 barrels per day of fuel. Three baseline refinery cases were used. This examination of permitting process impacts as a function of project profitability allows for a more general interpretation of the analysis. (DLS)

5320 Policies for energy facility siting on the urban coast. Morell, D. pp 285-309 of *Refining the waterfront. Alternative energy facility siting policies for urban coastal areas.* Morell, D.; Singer, G. (eds.). Cambridge, MA; Oelgeschlager, Gunn & Hain, Publishers, Inc. (1980).

Recommendations for policies which support innovative redevelopment efforts are proposed. The policies include alternate siting strategies for the urban waterfront, urban waterfront revitalization and energy facility siting, economics of energy facility siting, alternate energy technologies and the urban coast, government participation, and federal planning effects. (DLS)

5321 Energy, environment, and new communities in hot-arid areas of the Middle East. Farahat, A.M. Blacksburg, VA; Virginia Polytechnic Inst. and State Univ. (1980). 329p. University Microfilms Order No. 81-10,456.

Thesis (Ph. D.).

A conceptual model is proposed, showing how a contemporary urban community can be planned and designed for arid areas of the Middle East in a way that solves the problems, utilizes the potentials, and realizes the objectives previously mentioned. The model of the proposed urban community includes several proposed environmental design solutions, integrated into one structure. While the proposed solutions have not been applied yet, they are based on the integration of present successfully operating techniques. The proposed environmental-design solutions and their integration into one structure has been achieved through a systemic process. Pro-

water distillation, heating and cooling of buildings and greenhouses, actively and passively integrated. (3) Waste Recycling - for waste treatment, soil fertilization and irrigation, feeding aquatic algae, and methane gas generation. (4) Wind Energy Utilization - for generating electricity while possibly screening dust and sand out of wind. Finally, the research discusses basic issues of the proposed community implementation including the political context, economic aspects of the urban context, finance and ownership, and community organization. Proposed stages of implementation and their evaluation are also discussed.

5322 Energy development in the western United States: impact on rural areas. Murdock, S.H.; Leistriz, F.L. New York, NY; Praeger Publishers (1979). 382p.

Energy development in rural areas of the West presents opportunities for economic development, but the associated problems need to be addressed in a rational way by comparing actual data rather than assuming certain impacts. Available materials on western energy development are presented in a descriptive form that focuses on socio-economic impacts. The book is organized to present the overall dimensions of rural energy and technology development as well as to identify the pertinent literature sources. Among the impacts are changes in job and population characteristics and the effects on agriculture and local business, public sector costs, community services, social values, and social processes. The interrelationships of the impacts are noted and broad policies and programs to alleviate impacts are suggested. The authors are optimistic that an appropriate data base will be developed and that public activism on these issues will have positive benefits. 448 references, 6 figures, 75 tables. (DCK)

5323 Environmental quality and residuals management. Kneese, A.V.; Bower, B.T. Washington, DC; Resources for the Future, Inc. (1979). 352p.

Political, social and economic incentives and barriers to marketing environmental pollution control technology are discussed in light of the explosion of industrial production, energy conversion and transport of goods and people; the introduction of exotic materials; and increased awareness and expectations of health standards in all developed countries. The market model is shown to produce desirable properties on a certain value premise where the economy has certain structural characteristics. (PSB)

2903 Environment, Health, And Safety

REFER ALSO TO CITATION(S) 5314, 5320, 5321, 5323, 5357, 5363, 5374, 5400, 5459, 5472, 5509, 5610, 5614, 5684

5324 (ANL/AA-19) Land use and energy. Robeck, K.E.; Ballou, S.W.; South, D.W.; Davis, M.J.; Chiu, S.Y.; Baker, J.E.; Dauzvardis, P.A.; Garvey, D.B.; Torpy, M.F. (Argonne National Lab., IL (USA)). Jul 1980. Contract W-31-109-ENG-38. 177p. NTIS, PC A09/MF A01. Order Number DE81028475.

This report provides estimates of the amount of land required by past and future energy development in the United States and examines major federal legislation that regulates the impact of energy facilities on land use. An example of one land use issue associated with energy development - the potential conflict between surface mining and agriculture - is illustrated by describing the actual and projected changes in land use caused by coal mining in western Indiana. Energy activities addressed in the report include extraction of coal, oil, natural gas, uranium, oil shale, and geothermal steam; uranium processing; preparation of syngases from coal; oil refineries; fossil-fuel, nuclear, and hydro-electric power plants; biomass energy farms; and disposal of solid wastes generated during combustion of fossil fuels. Approximately 1.1 to 3.3 x 10⁶ acres were devoted to these activities in the United States in 1975. As much as 1.8 to 2.0 x 10⁶ additional acres could be required by 1990 for new, nonbiomass energy development. The production of grain for fuel ethanol could require an additional 16.9 to 55.7 x 10⁶ acres by 1990. Federal laws that directly or indirectly regulate the land-

use relevant federal regulations, and similar state and local regulations are described in this report. Federal legislation relating to air quality, water quality, and the management of public lands has the greatest potential to influence the location and timing of future energy development in the United States.

5325 Investigation into environmental activism. Larson, M.A. Madison, WI; Univ. of Wisconsin (1980). 145p. University Microfilms Order No. 81-07,037.

Thesis (Ph. D.).

A systematic review of the empirical generalizations in the environmental literature revealed a wide range of findings in terms of relationships between environmental concern and activism and communication, social, demographic, and psychological variables. The goal of this research was to test the soundness of the empirical generalizations in the environmental literature by attempting to replicate previously identified relationships between environmental activism and communication, social, demographic, and psychological variables. The research design compared environmentally active respondents to non-active respondents in a random sample of 548 Wisconsin adults and a select sample of 164 environmental activists from Madison, Wisconsin. A positive relationship was found between activism, social class and white-collar occupation. Activists tended to have lived in large urban areas before the age of 18. No relationship was found between activism and sex of respondent, religious preference, political-party preference or left-right ideology. A positive relationship was found between activism and belonging to community-action and political organizations. The activists tended to disbelieve in ability of technology to solve environmental problems and to believe in being personally responsible for solving problems. A positive relationship was found between activism and education level. No relationship was found between environmental activism and age.

5326 (DOE/EP-0021) Environmental trends to the year 2000. (Department of Energy, Washington, DC (USA)). Jul 1981. 23p. NTIS, PC A02/MF A01. Order Number DE81027695.

This analysis focuses on the environmental impacts of the National Energy Policy Plan and emphasizes those pollutants for which energy development and use play a significant role. Energy is by no means responsible for all the increases projected for the various emissions. The increase in relative contributions of the energy sector to emissions during the study period is within a range of zero to 15% for all selected pollutants with the exception of ash, captured particulates, and oil-shale waste. For that group, the energy sector contribution increases from 58% to 89%, primarily because of the production of oil from shale. If the oil-shale wastes were not included in these totals, energy-process wastes would be 62% of the national total of 250 million tons. Even though these figures represent total net emissions to the environment, rather than ambient concentrations, the assessment offers a sound basis for an important overall conclusion. The significant economic growth projected by the National Energy Policy Plan, and continuing free-market efforts to ensure the wise and efficient application of energy resources by the nation, can be achieved without forsaking reasonable environmental quality.

5327 (DOE/ET/12866-5) Residual-Energy-Applications Program environmental analysis report. (South Carolina Energy Research Inst., Columbia (USA)). Oct 1980. Contract AC09-77ET12866. 48p. NTIS, PC A03/MF A01. Order Number DE81027538.

It is recommended that a generic environmental analysis in support of the Residual Energy Applications Program (REAP) be undertaken. It should be guided by Department of Energy guidelines for compliance with the National Environmental Policy Act. It is further recommended that the Par Pond cooling system at the Savannah River Plant be given strong consideration for siting of the Energy Applied Systems Test (EAST) Facility. The Par Pond system has the potential to confine all potential environmental impacts of the construction and operation of the EAST Facility

within the boundaries of the Savannah River Plant. Characteristics of the EAST Facility, a place to test industrial scale waste heat recovery equipment, are described and a general description of Par Pond is given. A detailed literature review pertaining to fish in PAR Pond and birds near-by is presented.

5328 Making pollution prevention pay. Royston, M.G. (Center for Education in International Management, Geneva, Switzerland). *Harvard Business Review*; 58: No. 6, 6-8, 12, 14, 18-22(Nov 1980).

In November 1979, the ministers of the environment from the European countries and representatives from the United States and Canada met in Geneva under the auspice of the Economic Commission for Europe on the Protection of the Environment. Their purpose was to decrease pollution from industrial wastes. Long-range transboundary air pollution, or acid rain, from the world's metallurgy and power plants was thought to be damaging northern lakes and forests and had grown into a major international issue. The ministers and representatives signed a resolution to limit, gradually reduce, and prevent this form of pollution. They also adopted a declaration stating that economic development and technological progress must be compatible with the protection of the environment and advocating the use of no-waste technologies in their countries' industries. In this article, an authority on business and the environment augments the discussion begun at this important international meeting. He offers considerable evidence that alert companies can turn pollution prevention into profit and make their growth and survival congruent with environmental protection. The last 5 pages of the article are devoted to an appendix: Bibliography of No-Waste Technology.

5329 (DOE/EV/01340-1) Effects of atmospheric variability on energy utilization and conservation. Progress report, 1 January-June 30, 1981. Reiter, E.R.; Burns, C.C.; Cochrane, H.; Johnson, G.R.; Leong, H.; Sheaffer, J.D. (Colorado State Univ., Fort Collins (USA)). Dept. of Atmospheric Science. Jul 1981. Contract AS02-76EV01340. 99p. NTIS, PC A05/MF A01. Order Number DE81026308.

The grant period 1 January 1981 to 31 December 1981 constitutes the second year of a three-year effort. As in previous years, the research was focused on four major tasks: planetary wave variability and climate fluctuations; regional energy demand modelling; energy demand modelling for air conditioning; and economic factors in climate-sensitive space-conditioning systems design. Efforts in each of these rather broad topic areas are outlined and described in detail. Predicting the impact of climate variability on energy utilization involves understanding both the mechanisms underlying atmospheric variability and the response of energy demand systems to atmospheric variations. Summary descriptions of significant progress in both areas are presented. Studies of planetary wave variability involve both diagnostic and modelling analyses of a broad array of mechanisms linking anomalous regional and global features of the atmospheric circulation. Specific analyses focus on planetary wave anomalies manifest as precipitation surges in the equatorial Pacific, the southern oscillation and the quasi-biennial oscillation. Related studies of the thermal and barrier aspects of the continents, global teleconnections in anomalous weather patterns and the relationship of recent climate trends to planetary wave activity are also described. Progress is summarized in the development of a quasi-geostrophic model for testing the sensitivity of planetary wave modes to observed perturbations in boundary conditions. Considerable progress was also made in the development and application of our weather dependent models of energy demand for space conditioning. Preliminary results are presented for a regional test application of our community energy demand models.

5330 (LA-UR-81-899) Soil loss and leaching, habitat destruction, land and water demand in energy-crop monoculture: some quantitative limits. Gutschick, V.P. (Los Alamos National Lab., NM (USA)). 1981. Contract W-7405-ENG-36. 12p. (CONF-811006-1). NTIS, PC A02/MF A01.

From International conference on energy use management-III; West Berlin, F.R. Germany (26 Oct 1981).

The environmental impacts of growing biomass for energy, especially for liquid automotive fuels, are potentially large. They

are sensitive to the low power production per unit area (high land requirement) and to net energy balances. Initial quantitative estimates were made for impacts per unit power within several classes of impacts, and conversely, for limits to power produced if one avoids worst-class impacts. The following types of biomass energy technologies are considered: ethanol and methanol from grains and residues (temperate zone); jojoba wax (semi-tropical); ethanol from sugar cane and root crops (tropics); and silviculture for methanol via gasification.

5331 (ORAU/IEA-81-6(M)) Response of the oceans to increasing atmospheric carbon dioxide. Baes, C.F. Jr. (Oak Ridge Associated Universities, Inc., TN (USA)). Aug 1981. Contract AC05-76OR00033. 72p. NTIS, PC A04/MF A01. Order Number DE81028178.

The rate at which the oceans take up excess atmospheric carbon dioxide from the burning of fossil fuels is an important factor in determining the rate of increase in the atmospheric concentration of carbon dioxide and the maximum value it will reach. In this review are considered the relevant physical and chemical features of the ocean, the observational evidence of its response to increasing atmospheric carbon dioxide, and the uncertainties involved in modeling this response. The deep oceans are near saturation with calcite (the least soluble form of calcium carbonate). While the pressure dependence of this solubility and ocean circulation tend to produce calcite supersaturation of the upper ocean, these effects cannot account for the far greater supersaturation of the surface waters. This condition is probably maintained by the effects of photosynthesis and the biogenically controlled precipitation of calcium carbonate. After correcting for the expected effects of biological processes on the composition of seawater, several investigators have found evidence that the increasing carbon dioxide content of the atmosphere has already detectably affected the distribution of carbon in the upper ocean. While there are some complications and uncertainties from mixing effects, there seems reason to hope that this signature of excess carbon may soon become a valuable tracer for monitoring ocean response.

5332 Science and uncertainty: a jurist's view. Bazelon, D.L. (United States Court of Appeals for the District of Columbia Circuit, Washington). *Harvard Environmental Law Review*; 5: No. 2, 209-215(1981).

A seasoned judge speaks of common-law experience with scientific questions, especially in the area of negligence. Wondrous technological breakthroughs are balanced by harmful side effects, longevity increases allow for increased accident potentials, etc. Congressional solutions by regulatory agencies have placed new strains on the court's limited capacity by requiring closer review in areas that the judge can have very little real knowledge. Congressional intent is often unclear and invites judicial interpretation or the court must grant broad agency discretion. Judge Bazelon speaks also of differences between risk-taking and risk-disclosure. He notes that health hazards from indirect effects of energy, transportation, and consumer products are understood only dimly by the regulators, and the risk-assessment expert is in training. He ends with a plea for releasing value judgements by the decision-maker as a democratic check-and-balance for this scientific age. (PSH)

5333 (PB-81-121105) Chemical Testing and Assessment Research Committee - research strategy 1979-1985. (Environmental Protection Agency, Washington, DC (USA)). Oct 1980. 209p. NTIS, PC A10/MF A01.

This document was developed by the Chemical Testing and Assessment Research Committee and it presents a multi-year strategy for ORD's programs on Toxic Substances. This strategy is intended to serve as a basis for preparing each fiscal year's program proposals and for reviewing the progress of ORD's ongoing effort. The document will be updated annually by the Research Committee to refine the strategy and help assure the program's responsiveness to emerging concerns and priorities.

5334 (PB-81-123838) The benefits of air and water pollution control: a review and synthesis of recent estimates. Executive summary. Freeman, A.M. III. (Bowdoin Coll., Brunswick, ME (USA)). Dec 1979. 19p. NTIS, PC A02/MF A01.

The report has four major objectives. The first is to provide a critical review of those previous studies which have attempted to estimate air and water pollution control benefits in monetary terms or which might provide an empirical basis for making such an estimate. This review evaluates the theoretical framework underlying each of the estimates, the validity of the estimation technique, and the adequacy of the data.

5335 Delimitation of offshore areas: hard labour and bitter fruits at UNCLOS III. Brown, E.D. (Univ. of Wales, Swansea). *Marine Policy*; 5: No. 3, 172-184 (3 Jul 1981).

The provisions of the Draft Convention concerning the delimitation of maritime zones and the settlement of related disputes are analyzed and evaluated. The article falls into three main parts, which deal respectively with the territorial sea and the contiguous zone; the continental shelf and the exclusive economic zone (EEZ); and the delimitational problems of islands. It is concluded that the set of rules on delimitation of maritime zones drawn up at the Third United Nations Conference on the Law of the Sea (UNCLOS III) leaves much to be desired.

5336 Separability, functional structure, and aggregation for a class of models in environmental economics. Forster, B.A. (Univ. of Guelph, Ontario). *Journal of Environmental Economics and Management*; 8: No. 2, 118-133 (Jun 1981).

The purpose of this paper is to provide a theoretical bridge between the many-commodity general-equilibrium models and the simpler one good-one pollutant models used in environmental economics. The interest is in determining the conditions that will permit a vector of pollutants (or goods) to be treated as if it were only one quantity, the amount of environmental pollution (or consumption). A general-equilibrium model is constructed and the concepts of separability and functional structure are applied to examine the requirements for consistent aggregation. It is shown that this aggregation process may, in general, produce two entirely different sets of aggregate measures of pollution and consumption. This result is of theoretical and empirical significance. Alternative criteria for aggregation suggest that the aggregation depends upon very stringent features of the economy concerned. 21 references, 5 figures.

5337 NEPA litigation in the 1970s: a deluge or a drizzle. Liroff, R.A. (The Conservation Foundation, Washington, DC). *Natural Resources Journal*; 21: No. 2, 315-330 (Apr 1981).

This article examines several facets of litigation under the National Environmental Policy Act of 1969 (NEPA) during the 1970s. It briefly describes congressional expectations regarding lawsuits and then focuses on number of cases, characteristics of plaintiffs and defendants, and factors prompting aggrieved parties to seek judicial relief. NEPA cases are also compared to other civil cases as a measure of NEPA's impact on the federal courts. The future amount of litigation under NEPA may ultimately be influenced by congressional decisions regarding the availability of judicial review of agency decisions. Since the Republicans have gained control of the US Senate, and the House of Representatives is now somewhat more conservative, legislative proposals to limit judicial review under NEPA may find more positive reception. Efforts to limit citizen redress in the courts would be unfortunate. Litigation is often a product of administrative failure to recognize the legitimacy of environmental and other relevant values in decision-making. Some litigation, therefore, is unavoidable, but responsiveness to relevant values in the administrative process, and development of carefully reasoned policies based on more than political ideology, are the best ways to minimize future NEPA litigation. 3 tables.

5338 Economics of visibility protection: on a clear day you can see a policy. Repetto, R. (Harvard Univ., Cambridge, MA). *Natural Resources Journal*; 21: No. 2, 355-370 (Apr 1981).

Visibility policies which concentrate polluting activities in less-scenic areas are shown to be economically sound. Some exceptions occur in specific regions and when pricing mechanisms are more-efficient emission regulators. Visibility policies evolving from the Clean Air Act Amendments are highly selective in protecting

designated areas from pollution sources, but they balance incremental pollution damages against incremental abatement costs. This review of the technical and economic aspects of protecting visibility covers the issues of location choice, the extent of protection, and the method used in one-region and multi-region cases. 4 figures, 1 table. (DCK)

5339 Pennsylvania's technologically impossible air-pollution standards upheld. Guttman, J.M. *Natural Resources Journal*; 21: No. 2, 395-404 (Apr 1981).

Pennsylvania Power Co. resolves many previously unanswered important questions about the enforcement of technologically infeasible air-pollution standards and the appropriateness of the impossibility defense. The decision seems to follow both federal and state trends toward a stronger and more enforcement-oriented approach to air-pollution control. Wide acceptance of the impossibility defense would result in de-emphasizing the protection of public health in setting standards at the state level. Judicious acceptance of this defense at the enforcement level will result in equitable decisions in specific cases, without controverting the purpose and intent of the Clean Air Act itself or undermining its effectiveness. To allow the defense of impossibility indiscriminately would take the force out of technology forcing and would subvert the goals of Congress. The best resolution of the problem appears to be that expressed in Pennsylvania Power Co. - a close coordination of federal goals and policies with enforcement of state implementation plans. In this manner, consistent and uniform guidelines will be developed that allow sufficient flexibility to accommodate unique situations in state implementation.

5340 Three challenges of risk-benefit assessment. Ricci, P.F.; Douglas, J.H. (Electric Power Research Inst., Palo Alto, CA). *Electric Perspectives*; 13-19 (Spr 1981).

Protecting public health and safety requires consideration of the legal framework of risk-benefit assessment, its technological state-of-the-art, and how to communicate the results to the public effectively. The extremes of legislative intent and the degrees of instruction to the regulatory agency vary. Symbolic overtones, such as those attached to nuclear power, can be a serious complication in communicating any risk assessment. Further progress will depend on the development of public consensus, which will require a better public perception of risk and a better understanding of how perceptions form, how errors are likely to be included, and how new information can be communicated. 8 references.

5341 Shifting sands of Federal barrier-islands policy. Kuehn, R.R. *Harvard Environmental Law Review*; 5: No. 2, 217-258 (1981).

This paper discusses present practices and possible future options for Federal involvement with US barrier islands. Section I describes the characteristics and status of the Atlantic and Gulf Coast barrier islands. Section II explains the present programs of various Federal agencies. Section III reviews proposed legislation aimed at reducing Federal involvement in barrier-island development. (PSB)

5342 Regulation of the transportation of hazardous materials: a critique and a proposal. Marten, B.M. *Harvard Environmental Law Review*; 5: No. 2, 345-376 (1981).

This article is a description and analysis of the system of regulation of hazardous-materials transportation and a proposal for reform. It has four parts. Part I surveys the present scheme of federal, state, and local safety regulation of hazardous-materials transportation. Part II describes the failures of the present regulatory system and presents a framework for analyzing alternative approaches to preventing hazardous-materials-transportation accidents. Part III compares the present system with one such alternative, a system of strict liability. Part IV is a proposal for reforming hazardous-materials-transportation regulation by deregulating materials that are not extremely hazardous, and imposing strict liability on all transporters of hazardous materials.

5343 Markets in air: problems and prospects of controlled trading. del Calvo y Gonzalez, J.A. *Harvard Environmental Law Review*; 5: No. 2, 377-430 (1981).

This analysis is divided into three parts. Part I describes and compares a traditional system of prescriptive regulation, a pollu-

tion-permit scheme, and a mixed permit-regulation system. The part concludes that a pollution-permit approach alone cannot be offered as an alternative to prescriptive regulation. Limited applications of the marketable permit concept, however, may be employed effectively in conjunction with prescriptive regulation. Such a mixed system is superior to either a permit or prescriptive regulation regime alone. Part II considers the current regulatory framework under the Clean Air Act and EPA's mixed system, known as controlled trading. The analysis concludes that the controlled trading initiative has, to date, failed to reduce appreciably the cost of pollution abatement and has been largely inoperative. Part III proposes several alternative regimes. It suggests that the present limitations on transactions involving sources subject to New Source Performance Standards (NSPS) and nonattainment regulations should be relaxed. Rather than focusing on formal program distinctions, EPA should examine each transaction individually. The trade should be approved if the polluter meets its burden of showing the verifiability of the trade and EPA determines that it has the capability to enforce the transaction.

5344 Environment, energy, public policy: toward a rational future. Axelrod, R.S. (ed.). Contract FG01-79EV10044. Lexington, MA; D.C. Heath and Company (1981). 183p. (CONF-7906130—).

From Conference on energy and environment; Garden City, NY, USA (8 Jun 1979).

An interdisciplinary conference was held at Adelphi University (Garden City, NY) on energy and environmental problems from either an institutional or a policy-process perspective. Nine chapters are included in this proceedings; a separate abstract was prepared for each chapter. (DLC)

5345 Energy and the environment: conflict and resolution. Axelrod, R.S. (Adelphi Univ., Garden City, NY). pp 1-7 of Environment, energy, public policy: toward a rational future. Axelrod, R.S. (ed.). Lexington, MA; D.C. Heath and Company (1981).

From Conference on energy and environment; Garden City, NY, USA (8 Jun 1979).

Concern over the environment resulted in the passage of various environmental-protection legislation in the 1970s. However, the energy crisis threatens the progress in protecting the environment. Cost-effective analysis is not appropriate for resolving the conflict. A comprehensive environmental and energy policy is needed. The author feels that the country is at a critical juncture, and that there is an opportunity to reshape our political institutions and the future. (DLC)

5346 Disincentives for policy leadership in energy and the environment: the structure of voter opinion. Laney, N.; Ingram, H. (Arizona Univ., Tucson). pp 15-36 of Environment, energy, public policy: toward a rational future. Axelrod, R.S. (ed.). Lexington, MA; D.C. Heath and Company (1981).

From Conference on energy and environment; Garden City, NY, USA (8 Jun 1979).

This chapter examines the structure of public opinion on energy and environmental matters and explores the implications of these attitudes for legislative action. The data come from a study of voter attitudes in the Four Corners states of Arizona, New Mexico, Colorado, and Utah. The inconsistent and fragmented attitudes that voters hold about energy and environmental issues, well as water issues, make it very difficult for legislators to formulate and support coherent programs. It is likely that energy-environment trade-off questions will continue to be fought out on a piecemeal, issue-by-issue basis as in the past. 10 references, 1 figure, 13 tables. (DLC)

5347 Notes from no man's land: the politics and ecology of energy research and development. Rosenbaum, W.A. (Univ. of Florida, Gainesville). pp 61-79 of Environment, energy, public policy: toward a rational future. Axelrod, R.S. (ed.). Lexington, MA; D.C. Heath and Company (1981).

From Conference on energy and environment; Garden City, NY, USA (8 Jun 1979).

During 1980, federal energy R and D expenditures were an estimated \$5.4 billion. Major aspects of federal R and D programs

have been called no man's land where a policy vacuum invites political resolution such as in the conflict over the nuclear-fuel enrichment plant which was eventually settled at Portsmouth. A breakdown is given of the federal energy R and D expenditures. The nature of the US political system encourages spending on big projects mainly for their economically stimulating effect. The US nuclear and fossil-fuel programs are discussed. Ways for restoring environmental balances in the national energy R and D program are discussed. 30 references. (DLC)

5348 Energy-environmental trade-offs in the courts: nuclear and fossil fuels. Wenner, L.M. (Univ. of Illinois, Chicago). pp 81-109 of Environment, energy, public policy: toward a rational future. Axelrod, R.S. (ed.). Lexington, MA; D.C. Heath and Company (1981).

From Conference on energy and environment; Garden City, NY, USA (8 Jun 1979).

Court decisions affecting nuclear and fossil-fuel plants are considered in this chapter. A breakdown of the decisions is given, according to initiator, pro-environment or pro-power decision, and circuit. Of the fossil-fuel power cases, nearly half were decided in favor of the environment, while the preponderance of the nuclear-power cases were decided in favor of power development. The more-favorable attitude of courts toward the environment in fossil-fuel cases is partly due to the role of the Environmental Protection Agency. Since most experts cannot agree about the real costs of any type of energy conversion, the courts are properly used to settle such controversies. 137 references. (DLC)

5349 Institutional constraints upon environmentally sound energy policy. Danek, G.A. (Arizona Univ., Tucson). pp 153-166 of Environment, energy, public policy: toward a rational future. Axelrod, R.S. (ed.). Lexington, MA; D.C. Heath and Company (1981).

From Conference on energy and environment; Garden City, NY, USA (8 Jun 1979).

If the use of energy is merely a means of pursuing life-quality objectives, then energy policy should represent broader social goals. Among such goals, environment integrity would still seem to rank quite high. However, the nation seems bent on general energy situations that are likely to raise serious problems in terms of environmental integrity. Therefore, it is incumbent upon environmental analysts and administrators to bring these fundamental incongruities to the attention of administrative as well as legislative policy makers. This, however, is difficult, at best, under current institutional constraints. External mechanisms are constrained both by the timing and the authority of their inputs, and internal mechanisms are constrained by their lack of access to the process of establishing priorities. These factors need not prevail, however. To the extent that planners and analysts turn their analytical capabilities inward and investigate their role within complex organizations, avenues of access may become apparent. 33 references.

5350 Oil pollution by ocean vessels - an environmental tragedy: the legal regime of flags of convenience, multilateral conventions, and coastal states. Dempsey, P.S.; Helling, L.L. (Univ. of Denver, CO). *Denver Journal of International Law and Policy*, The; 10: No. 1, 37-87 (Fall 1980).

The dramatic growth in the use of flags of convenience by the maritime industry has become an issue of international concern. A variety of factors: including labor, tax, and environmental interests which impose higher operating costs; have pressured fleet operators to opt for vessel registration in those countries that impose only a minimum of regulation. Consequently, ships bearing a flag of convenience are often characterized by their poor conditions, inadequately trained crews, and frequent collisions. The authors discuss the international legal regime that allows convenient vessel registration, the effects that poorly regulated fleets have on the environment, and current multinational agreements that establish higher safety standards. They propose a multilevel regime to effectively deter continued environmental pollution by ocean vessels.

5351 Noise pollution in urban ghettos: assessment, issues and challenges. Harris, W.M.; Harris, W.L. *Journal of the National Technical Association*; 54: No. 3, 71-74 (Sum 1980).

More recently noise has been considered an environmental pollutant. This paper considers the assessment, issues and challenges of noise pollution as it impacts the innercity ghetto community. Measurement standards and quantitative assessment of various urban ghetto noise sources are considered and evaluated in this paper. Noise sources proposed for investigation include traffic noise, noise generated by people, and construction noise. Four key issues surround noise pollution in ghetto neighborhoods. Several challenges arise from the issues. The roles offer prescription for resolving some of the issues affecting noise pollution in black, urban communities.

5352 What we know about acid rain. Curtis, C. *Electric Perspectives*; 33-39(Win 1980).

Justification for acid rain research as a prerequisite to rational legislation is presented from the perspective of the electric utilities. Misleading media presentations need to be replaced with data on the chemical composition of precipitation. (DCK)

5353 Air quality and urban waterfront development: a review of government regulations and attitudes. Ash, T. pp 81-98 of *Refining the waterfront. Alternative energy facility siting policies for urban coastal areas.* Morell, D.; Singer, G. (eds.). Cambridge, MA; Oelgeschlager, Gunn & Hain, Publishers, Inc. (1980).

Air quality is one of the principal constraints to the siting of new facilities on urban waterfronts, especially those with high levels of air pollution even when using advanced abatement technology. Air quality issues in Hudson County illustrate this concern. Afflicted with one of the highest cancer rates in the US, it is part of a region that the US EPA has ranked second in priority nationally for pollution abatement. Certain onshore support facilities for OCS development, such as oil storage, transfer and refining, add a tremendous amount of pollution to the air. Some argue that these facilities should be banned in existing nonattainment areas. (DLS)

5354 EPA's emission offset policy and energy facility siting. Merchant, B. pp 99-114 of *Refining the waterfront. Alternative energy facility siting policies for urban coastal areas.* Morell, D.; Singer, G. (eds.). Cambridge, MA; Oelgeschlager, Gunn & Hain, Publishers, Inc. (1980).

Hudson County, New Jersey, with its prime waterfront location, has traditionally been chosen by industry as the site for petrochemical and energy facilities serving New York area, and indeed the whole northeast. In recent years, concern about seriously high concentrations of petrochemical oxidants and other airborne pollutants has caused a backlash among county residents. In coping with the challenge of building new facilities in nonattainment areas, which include most of the country's urban waterfronts, the US EPA has developed an emission offset policy designed to allow sufficient flexibility in implementing the Clean Air Act so as to permit needed growth to occur. Because of the vital importance of this policy to energy facility siting in urban coastal areas, the new emission offset policy is examined. (DLS)

5355 Nuclear power risks: challenge to the credibility of science. Welch, B.L. (Welch Associates, Woodbridge, CT). *International Journal of Health Services*; 10: No. 1, 5-36(1980).

For a quarter of a century the Federal Government and the nuclear industry have deliberately deceived the American public about the risks of nuclear power. Facts have been systematically withheld, distorted, and obscured, and calculations have been deliberately biased in order to present nuclear power in an unrealistically favorable light. Most persistent and flagrant have been: (a) attempts to normalize public perception of nuclear accident casualties with those of more familiar accidents; and (b) the cloaking of the objectively undocumentable faith of the atomic energy establishment that a nuclear accident is extremely unlikely in a smokescreen of invalid, pseudoquantitative statistical probabilities in order to convince the public that the chance of an accident is negligible. Prime examples of these abuses are found in the Rasmussen report on nuclear reactor safety and in its representation to the public.

5356 Handbook of variables for environmental impact assessment. Canter, L.W.; Hill, L.G. Ann Arbor, MI; Ann Arbor Science Publishers, Inc. (1979). 212p.

This Handbook provides (1) a comprehensive listing of variables relevant to the environmental quality objective of water resource planning; and (2) descriptions of measurement, prediction and assessment techniques for the selected variables when used for environmental impact assessments of water and related land-management studies. Variables, or assessment variables, refer to those characteristics of the environment used to describe the baseline environmental setting and upon which impacts may occur. This Handbook is organized by section into those variables associated with the terrestrial, aquatic, air and human interface environments. For each of the 62 selected variables, information is presented on their definition, measurement needs for establishing baseline conditions, and impact prediction and assessment. Functional curves are also included for most of the variables. A functional curve represents an empirical relationship between objective measurements of a variable and a subjective evaluation of the quality (good to bad) of that variable in the environmental setting.

2904 Natural Resources

REFER ALSO TO CITATION(S) 5303, 5304, 5376, 5469, 5500

5357 (LBL-12640) Urban ecosystem and resource-conserving urbanism in Third World cities. Meier, R.L.; Berman, S.; Campbell, T.; Fitzgerald, C. (Lawrence Berkeley Lab., CA (USA)). Mar 1981. Contract W-7405-ENG-48. 195p. NTIS, PC A09/MF A01. Order Number DE81029854.

This study is important to the future policies of Western countries and Japan because of the rising overall of cities in the developing world is projected to match that of the developed within the span of a human generation. Although the experience reported for the cases has shown that a resource-conserving urbanism approach can be an effective tool of analysis, it is not sufficient by itself to be the foundation for a given USAID urban program. It addresses only conditions within a given urban border, while a program must take into account such matters as: (1) general conditions of political stability; (2) prospects for continued growth in international trade; (3) relationships of the national government with the United States; and (4) the funds available within the United States for covering existing commitments, and some local factors. The method is not even very sensitive to comparisons of cities for choosing the most suitable program locales because the accumulated information illuminates the uniqueness of each urban community. It will, however, generate most of the up-to-date information needed. (PSB)

5358 (MIT-EL-79-019) Water-rights-transfer evaluation procedure with applications for Western energy development. Gerstle, J.H.; Marks, D.H. (Massachusetts Inst. of Tech., Cambridge (USA). Energy Lab.). Feb 1979. Contract AM01-76EI02295. 75p. NTIS, PC A04/MF A01. Order Number DE81029732.

This report deals with questions of water supply for coal development in the semiarid western United States. A method is developed to evaluate yields of water rights in appropriation or permit systems of water administration. Water rights are characterized in terms of location, priority, decreed maximum diversion, actual diversion in periods of low flow, and consumptive use. Transfers of water rights are evaluated in this method by using institutional procedures as framework for analysis. A case study is performed on the North Fork of the Powder River, Wyoming, in which institutional considerations are discussed, and water rights are evaluated for a hypothetical facility. This procedure is not limited to energy facilities but may be used in most cases of water rights transfers. The method is designed for use with easily obtained data in order to facilitate its use in practice.

5359 (NP-1903562) Analysis of socioeconomic issues and impact of development of the Bravo Dome carbon dioxide field. Final report, February 1, 1980-January 31, 1981. Nisbett, R.T. (Eastern Plains Council of Governments, Clovis, NM (USA)). Jul 1981. 130p. (EMD-2-68-1504). New Mexico Energy and Minerals Department, Santa Fe. Order Number DE81903562.

The purpose of this study is twofold: (1) to examine the economic base of the region which surrounds the Bravo Dome area;

and (2) to analyze the socioeconomic impacts resulting from the development of the Bravo Dome Carbon Dioxide Gas Unit. Baseline data was collected and analyzed in the economic sectors of population; employment; income; retail sales; bank deposits; farms; acreage and value; housing and construction; and utilities. A qualitative description of community services and facilities was included in the economic baseline. A description of the CO₂ energy development includes the use of multiple scenarios allowing for differing sequences of development. In order to analyze the quantitative impacts upon the existing economic base, several economic assumptions were utilized. The economic base or export model was utilized to determine a basic employment multiplier. In order to assess the fiscal impacts, housing demand, and mitigation impacts, a qualitative approach was taken. The qualitative approach does not attempt to precisely determine the impacts in dollar terms, but rather is directed toward identifying potential problems. The final section is a description of mitigation plans and proposals which have been identified by the study. This section includes sources of state funds and federal funds, assistance to local government, and mitigation strategies.

5360 Reducing consumption in periods of acute scarcity: the case of water. Berk, R.A.; Cooley, T.F.; LaCivita, C.J.; Parker, S.; Sredl, K.; Brewer, M. (Univ. of California, Santa Barbara). *Social Science Research* ; 9: No. 2, 99-120 (Jun 1980).

This paper examines the impact of water conservation efforts in four California communities selected in part because of the range of conservation programs launched. The analysis will rest on 8 years of monthly data aggregated to the community level and will employ both Box-Jenkins (1976) procedures and techniques for pooled cross-sectional and time-series data (Kmenta, 1971, pp. 508 to 517). Theory will be drawn from social psychology and microeconomics; the former used to characterize certain shifts in the demand curve for water, the latter used to explain changes in consumption as a function of exogenous changes in price.

5361 Impact of increased alcohol production on agriculture: a simulation study. Webb, S.B. (Univ. of Michigan, Ann Arbor). *American Journal of Agricultural Economics* ; 63: No. 3, 532-537 (Aug 1981).

This paper seeks to estimate the upward slope of the supply curve of ethanol by estimating the response of agricultural prices to various levels of corn alcohol production. An alcohol fuel program is, on the other hand, an agricultural policy as well as an energy policy. So a second purpose is to predict the impact of increased alcohol fuel production on important dimensions of US agriculture. The US agricultural economy as modeled in the NIRAP program appears to be capable of adjusting without major difficulties to even high levels of fuel alcohol production. The price of corn and cost of alcohol would rise significantly, but not so high as to rule out the possibility of replacing with alcohol a tenth of current gasoline consumption. This prediction of great responsiveness by American agriculture is not surprising in view of its historical ability to adjust to shocks at least as large as those resulting from high levels of alcohol production. The extensiveness of the relationships modeled in NIRAP not only gives insights into the indirect effects of increased alcohol production but also probably accounts for why the direct effects are so mitigated. 10 references, 1 table.

5362 If there's a national water crisis, you can't tell it in Washington. Mosher, L. *National Journal* ; 13: No. 30, 1332-1335 (25 Jul 1981).

The Reagan Administration prefers state authority over water issues to a national water policy, and Congress is concentrating on only a few traditional water projects despite warning from outside Washington of an impending water crisis. Some recommend using the watershed or river basin rather than state boundaries as a basis for policy, but Interior Secretary James Watt prefers to limit the federal role. A major issue is changing the federal spending bias. While the media reflect warnings of drought, waste, and pollution, the Water Resources Council and other groups will probably be eliminated. The amount of water consumed compared to that returned to the system was a net loss of 106 billion gallons of fresh water each day in 1975 and is projected to be 135 billion gallons by the year 2000. However policy is decided, those who seek

better water management fear it will remain fragmented and unresponsive as well as expensive. (DCK)

5363 Nation's ailing timber industry finds it has a friend in Washington. Mosher, L. *National Journal* ; 13: No. 28, 1237-1241 (11 Jul 1981).

Despite reforestation and management programs, the timber industry is depleting its supply of privately owned trees and is eyeing the 89 million acres of national forest timber. Heavy lobbying by the industry and a responsive assistant Secretary of Agriculture are likely to double tree harvests and exceed the replacement level. Developers consider old growth as waste that is not contributing to the national economy, yet rapid depletion of private forests is adversely affecting lumber prices and regional economies. Weyerhaeuser, for example, plans to shift its harvest focus from western stands to second-growth southern forests. The Multiple Use Sustained Yield Act of 1960 protects forests by matching harvests with growth, but the present administration wants to make use of old stands before insects and fire make them unusable by removing the non-declining even-flow policy from these stands. Critics agree that the Pacific Northwest needs change in the present policy, but question how the industry will discipline itself once the economy is firm. They also worry that damage to watersheds and wildlife forage will be irreparable. A discussion of these issues covers the concepts of roadless wilderness areas versus accusations of environmental overkill. (DCK)

5364 Optimal management of renewable resources with growing demand and stock externalities. Berck, P. (Univ. of California, Berkeley). *Journal of Environmental Economics and Management* ; 8: No. 2, 105-117 (Jun 1981).

The optimal regulation of or management of renewable resources cannot be meaningfully reduced to a simple rule. Neither choosing the optimal long-run renewable resource stock nor attaining the planned goal is easy. Simply equating a rate of growth to a rate of time preference - as if determining the rate of time preference were simple - will not work if there is anticipated growth in demand or a significant externality attached to the resource stock. Failure to account for demand growth or an externality both result in too low a plan for the resource stock. In the case of an externality, a regulatory agency might find the traditional tax tool for correction of an externality to be very difficult to handle. Taxing the product - the easiest tax to levy - has an effect on stock that is critically mediated by the slope of the unit cost curve. If the curve is flat, the tax has little effect on ultimate stock. Regulation of production techniques will be inefficient, while stock subsidies are hard to administer because of the difficulty in measuring stock and the requirement for a dispersion of public monies. 18 references, 3 figures.

5365 Institutional limits to national public planning for forest resources: the Resources Planning Act. Corner, H.J. (Univ. of Arizona, Tucson); Schwitzer, D.L. *Natural Resources Journal* ; 21: No. 2, 203-222 (Apr 1981).

Planning by Forest Services under the Forest and Rangeland Renewable Resources Planning Act (RPA) is reviewed to identify factors which are likely to hinder the planning process. The factors are separated into those which are inherent to the bureaucratic and political context and those which are the traditional perceptions of foresters on the planning teams. Planning constraints on assessments, forecasting, land use policies, and political action are found to proceed from both the institutional and traditional sources. Strong centralized control is incompatible with the US political system, but the high politicization of public planning tends to moderate legislative intent and limit new directions to marginal and incremental changes. The process can invite public distrust of planning if it is not recognized. (DCK)

5366 Exhausted earth. Myers, N. *Foreign Policy* ; No. 42, 141-155 (Spr 1981).

Species depletion is irreversible and represents a global loss of hereditary stock, particularly in the tropics where developing countries are situated and where developed countries use technology to exploit species and genetic resources for economic gain. The US should lead in resolving this problem, which involves modern agricultural productivity based on a highly restricted genetic base

pollution and potential pollution in natural environments is destroying much of this genetic reservoir. The problem should be placed on political agendas as a strategic resource issue to increase awareness, followed by formal policy commitments at international forums. Genetic conservation should be seen as a common heritage with global responsibility. Subsidies from international development organizations are needed. The US can contribute both financial and technical support, but should keep a low profile in favor of a grass-roots consensus. (DCK)

5367 Developing a national water policy: problems and perspectives on reform. Rhodes, J.J. (House of Representatives, Washington, DC). *Journal of Legislation*; 8: No. 1, 1-15 (Win 1981).

A new national water policy is needed to handle critical current issues instead of continuing to rework long-standing social and regional conflicts. A joint Congressional committee should be formed to develop and implement a water strategy that can avoid massive shortages and economic disruptions. The new policy must consider all the competing uses of water and must encourage greater cooperation among the competing institutions. An appropriate policy will address water quality, hydroelectric development, in-stream-flow uses, and ground-water depletion as well as the legal rights set out in state, Federal, and Indian laws. A technological solution could make inter-basin water transfers on a national and international basis. The present fragmented body of laws and regulations needs to be unified and focused on major programs and policies. The policy of letting Federal agencies attend to small, non-controversial projects could be expanded. 67 references. (DCK)

5368 Interim deep-seabed mining legislation: an international environmental perspective. Oliver, C.D. (Univ. of Notre Dame, South Bend, IN). *Journal of Legislation*; 8: No. 1, 73-103 (Win 1981).

After years of deliberation and compromise, the United States has passed an interim deep seabed mining act with strong controls for environmental protection. The mining consortia involved in the development of deep ocean mining have displayed a willingness to cooperate in establishing such controls, because their cooperation aided the passage of legislation promoting the timely development of investment capital. Prospective profits are substantial. Mining operators can, therefore, afford to proceed with caution. Without compulsion by international agreement, the US has undertaken the responsibility to impose upon domestic mining operations stringent requirements for the protection of the shared ocean environment. In so doing, the US has not only demonstrated its commitment to achieving international environmental goals but also set the stage for ultimate ratification of the oceanic regime established by the Law of the Sea Treaty. A review of the Deep Seabed Hard Mineral Resources Act's history and provisions is followed in Appendix I with a comparison of environmental-impact provisions of the Act and the Law of the Sea, and in Appendix II with a directory of deep-sea mining consortia. 102 references.

5369 Analysis of the recycling coefficients of non-ferrous metals in the US economy, 1959-1976. Carlsen, E.H. (William Paterson College of NJ, Wayne). *Conservation and Recycling*; 4: No. 1, 1-8 (1981).

The study described accounts for fluctuations in secondary metals recovery relative to that of total metals consumption in the case of four key non-ferrous metals: copper, aluminum, lead and zinc with steel as a point of comparison. Multiple regression analysis was utilized to determine the effect of various factors on a measure of such recycling activity, the recycling coefficient. 10 refs.

5370 Non-Indian federal-reserved water rights. Waring, S.L. (Hall and Evans, Denver, CO); Samelson, K.S. *Denver Law Journal*; 58: No. 4, 783-799 (1981).

The federal reserved water rights doctrine is an entirely court-created concept first applied to an Indian reservation in Winters v. United States. In Winters, the United States Supreme Court held that when the federal government reserved the Fort Belknap Indian Reservation in Montana, the government implicitly reserved

water rights. This article examines the extension of the Winters doctrine to non-Indian federal reservations and considers some of the legal issues associated with this extension. The article describes some of the various types of federal reservations and their sources of authorization and includes a discussion of the applicability of the federal-reserved water rights doctrine to each reservation. Special attention is given to a 1979 opinion of the Solicitor of the Department of the Interior since this document represents the most comprehensive statement by the Solicitor on federal-reserved water rights. An examination of recent trends and developments, which suggest the declining fortunes of the doctrine of federal-reserved water rights, concludes the analysis. 160 references.

5371 Recent Developments in Colorado groundwater law. Hannay, F. (Davis, Graham and Stubbs, Denver, CO). *Denver Law Journal*; 58: No. 4, 801-823 (1981).

In the twelve years since the passage of the Water Rights Determination and Administration Act, the Colorado judiciary has undertaken the task of defining and interpreting the ambiguities in the act. Although progress has been made, the process is still a long way from completion. More specific guidelines are necessary for determining the tributary waters of groundwater. The process of integrating tributary groundwater and surface water must be further refined. The treatment of nontributary groundwater is overshadowed by confusion and uncertainty. The two recent cases that water law practitioners hoped would clarify this area have proved to be a disappointment. The Colorado Supreme Court will have an opportunity to clarify the law in Colorado as it relates to nontributary groundwater when it reviews the Consolidated Ruling of the special water judge. The question that must be answered by the court is: Can nontributary groundwater be appropriated, and if so, how and by whom? Until this threshold question is clearly resolved, the law in Colorado on this point will remain in flux. 194 references.

5372 Coping with the General Mining Law of 1872 in the 1980's. Knutson, R.D.; Morris, H.G. Jr. (Sherman and Howard, Denver, CO). *Land and Water Law Review*; 16: No. 2, 411-456 (1981).

In this article the authors examine the difficulties encountered by modern hardrock mineral explorers in locating and maintaining unpatented mining claims on the public domain, under the General Mining Law of 1872. The authors point out the tension between the requirements of the General Mining Law, on the one hand, and the economic and technological realities of hardrock mineral exploration, on the other. The article outlines practical solutions within the framework of court decisions constraining the General Mining Law.

5373 Costly innovation and natural resources. Robson, A.J. *International Economic Review*; 21: No. 1, 17-30 (Feb 1980).

This paper models costly but deterministic and continuous innovation in conserving natural resources. The model of Section 2 is thus an extension of either Stiglitz or Garg and Sweeney to include a simple process of costly innovation that yields new insights rather than results already obtained elsewhere. The time-honored method of modelling myopia in growth models assumes a constant savings rate. Additional analogous assumptions needed to close the present model are taken to be: (1) the rate of exploitation of the depletable resource is constant; (2) a constant fraction of output is used to finance innovation. Then it is shown in Section 3 that innovation and exploitation of the depletable resource are more fundamental than the savings rate in that they affect the asymptotic growth rate, whereas the savings rate does not. Section 4 considers an explicitly optimal regime. The optimality conditions derived are familiar, with the exception of an efficiency condition for innovation. The economic interpretation is noted. Optimal paths are shown in Section 5 to converge to balanced growth (or decay) paths, and the savings rate, the rate of exploitation and the fraction of output used to finance innovation are asymptotically constant. Comparative statics in Section 6 investigate determinants of the endogenous asymptotic growth rate. Section 7 shows that the Rawlsian criterion can be treated as a limiting case.

- 5374 **Institutional purpose and the management of Virginia's coastal wetlands.** Mabbs-Zeno, C.C. Blacksburg, VA; Virginia Polytechnic Inst. and State Univ. (1980). 220p. University Microfilms Order No. 81-10,467. Thesis (Ph. D.).

This dissertation attempts to provide a method or improved definition of institutional goals. First, the concept of an institution is reviewed and related to institutional change. Next, procedures for placing goals in a hierarchy are developed to facilitate evaluation of alternative institutions and a set of possible goals of institutions is culled from previous research and placed in a hierarchy which can be used as a checklist for researchers conducting institutional analysis. Finally, part of the method for institutional analysis is illustrated by a case study of the current institutions for wetlands management. The use of a goal hierarchy for the evaluation of institutional alternatives is illustrated by the case study of coastal-wetlands management in Virginia. Each performance goal suggested in the checklist of goals is examined for relevance and the level of goal attainment under current institutions and market institutions is measured for each relevant goal. The accuracy of information during problem recognition is evaluated, the expected impact of two alternative institutions on wetlands use is reviewed, and the remaining problems of wetlands management under each institution are identified. This analysis of two institutions may be compared to similar analyses of other alternatives to assist policy makers in choosing what changes to support.

- 5375 **United States v. New Mexico: purposes that hold no water.** Elliott, J.F. *Arizona Law Review*; 22: No. 1, 19-47(1980).

This Comment will first present an outline of the Court's past treatment of the reserved rights doctrine and recount the majority and dissenting opinions in *United States v. New Mexico*. Because the interpretation of the Organic Act constitutes the major issue in this case, attention will then be focused on the different modes of statutory construction employed by the majority and dissent. Finally, an independent analysis that supports the dissent's construction of the Act will be offered.

2905 Research, Development, Demonstration, And Commercialization

REFER ALSO TO CITATION(S) 5430, 5508

- 5376 **(BNL—29751) Role of large scale energy systems models in R and D planning.** Lamontagne, J. (Brookhaven National Lab., Upton, NY (USA)). Nov 1980. Contract AC02-76CH00016. 13p. (CONF-801126-3). NTIS, PC A02/MF A01. Order Number DE81026058.

From ORSA/TIMS joint national meeting; Colorado Springs, CO, USA (9 Nov 1980).

Long-term energy policy deals with the problem of finite supplies of convenient energy sources becoming more costly as they are depleted. The development of alternative technologies to provide new sources of energy and extend the lives of current ones is an attractive option available to government. Thus, one aspect of long-term energy policy involves investment in R and D. The importance of the problems addressed by R and D to the future of society (especially with regard to energy) dictates adoption of a cogent approach to resource allocation and to the designation of priorities for R and D. It is hoped that energy systems models when properly used can provide useful inputs to this process. The influence of model results on energy policy makers who are not knowledgeable about flaws or uncertainties in the models, errors in assumptions in model inputs which can result in faulty forecasts, the overall usefulness of energy system models, and model limitations are discussed. It is suggested that the large scale energy systems models currently used for assessing a broad spectrum of policy issues need to be replaced with reasonably simple models capable of dealing with uncertainty in a straightforward manner, and their methodologies and the meaning of their results should be transparent, especially to those removed from the modeling process. Energy models should be clearly related to specific issues. Methodologies should be clearly related to specific decisions, and should allow adjustments to be easily made for alternative assumptions

and for additional knowledge gained during the evolution of the energy system. (I.C.L.)

- 5377 **(DOE/ET/25407—1) Status of the DOE battery and electrochemical technology program II.** Roberts, R. (Mitre Corp., McLean, VA (USA). METREK Div.). Dec 1980. Contract AC01-79ET25407. 279p. (MTR—80W15). NTIS, PC A13/MF A01. Order Number DE81029879.

This report reviews the status of the Department of Energy Subelement on Electrochemical Storage Systems. It emphasizes material presented at the Department of Energy Battery and Electrochemical Contractors' Conference held December 10-12, 1979. The conference stressed secondary batteries, however, selected mechanically rechargeable batteries and aspects of energy conservation in industrial electrochemistry were included. Batteries in the research, development and demonstration phases included are: near term: lead-acid, nickel/iron, nickel/zinc; advanced: lithium/metal sulfide, sodium/sulfur, zinc/chlorine; and research and development: metal/air, hydrogen/chlorine, zinc/bromine, redox, organic electrolytes, solid-state. Supporting research on electrode reactions, cell performance modeling, new battery materials, and other topics are included. Studies related to energy conservation and alternative processes in electrochemical industry are reviewed. The potential contributions of the battery program to the various DOE missions supported: electric vehicles, photovoltaic systems, distributed electrical energy systems, and energy conservation in industry are discussed. The report stresses advances during the period June 1978 through December 1979.

- 5378 **Taking technology to market.** Ford, D.; Ryan, C. *Harvard Business Review*; 59: No. 2, 117-126(Mar 1981).

For many years, the concept of the product life cycle has helped managers maximize their return on product sales. But according to the authors of this article, using a technology solely in product sales is no longer enough. Today, companies face high R & D costs, competitive pressures from low-cost producers, capacity limitations, antitrust laws, financial difficulties, and foreign trade barriers. This means that they must improve the rate of return on their technology investments by marketing their technology as completely as possible during all phases of its life cycle. The technology life cycle—derived from the product life cycle—pinpoints the changing decisions companies face in selling their know-how. The authors also discuss both the competitive dangers of transferring technology to low-cost foreign producers and the growing role of intermediaries in technology sales. They stress the importance of having a highly specialized staff to plan a company's technology marketing, a responsibility that should be assigned neither to the part-time attention of top management nor simply to marketers or strategic planners.

- 5379 **Decision theoretic model of Congressional technology assessment: a theoretical examination of the characteristics of complete assessment reports, with applications.** Gray, L. Bloomington, IN; Indiana Univ. (1981). 477p. University Microfilms Order No. 81-12,442.

Thesis (Ph. D.).

The main objective of the dissertation is to clarify the notion of a complete assessment report. It is suggested that the role of Congressional TA in policy formation can be modeled as a two-level informing process. On the first level, assessment teams acquire the information that they present in the assessment report. On the second level, legislators become aware of the decision problem that they face with respect to a technology-laden policy issue. This level is modeled as the identification of the legislator's individual decision matrix. An assessment report is argued to be complete when it provides the information the Daddario Subcommittee seemed to want when they drafted the Technology Assessment Act of 1972, and it is sufficient for the completeness of the report, in this sense, that the product of the first level, the assessment report, support a justification of the product of the second level, the individual decision matrix. The dissertation has twelve chapters, separated into an Introduction and three Parts. Part I traces the historical development of congressional TA. In Part II, a decision-theoretic model is presented for the role of congressional TA in policy formation. Given even the unique personality and political position of each legislator, there remains in his perception of a policy issue a core of factual

non-nuclear states. The purpose of IFA is to provide legislators with a respectable source for this information, and ultimately to allow a justification of those policy decisions that are justifiable. In Part III, the model developed in Part II is put to work on several current problems.

2906 Nuclear Energy

REFER ALSO TO CITATION(S) 5348, 5497

5380 Coal and nuclear energy. A basis for a secure energy supply. Leuschner, H.J. (Rheinische Braunkohlenwerke A.G., Koeln (Germany, F.R.)). *Braunkohle*; 32: No. 10, 306-308 (Oct 1980). (In German).

5381 (DOE/EIA-0278) Nonresidential buildings energy consumption survey: fuel characteristics and conservation practices. (Department of Energy, Washington, DC (USA). Energy Information Administration). Jun 1981. 348p. NTIS, PC A15/MF A01. Order Number DE81027671.

This report presents data on energy uses and on conservation practices employed in nonresidential buildings for the 48 contiguous states and the District of Columbia. The information was collected through personal interviews conducted with building representatives between October 1979 and January 1980. A summary of the survey design, data collection procedures, and techniques used to convert the sample data to national estimates is found in Appendix A. The data are presented in two basic sets of tables. The first set presents estimated counts and percent distributions by fuel end uses, fuel oil conversions, number and types of fuels used, types of heating and cooling systems, and percentage of the building heated or cooled for selected building characteristics. These building characteristics include: location, structural features, use and occupancy characteristics, and types of heating and cooling systems. The second set presents the same building characteristics by energy conservation features of the buildings (additions of insulation, weatherstripping and caulking, treated glass and outside shading) and conservation practices (reduction in heating and cooling and regular maintenance) undertaken by the building management. Information presented in additional appendices are: limitations of the data; a copy of the building questionnaire; US weather zone map; census regions; utility forms; and a glossary. (MCW)

5382 Supply-side non-proliferation. Greenwood, T.; Haffa, R. Jr. (Massachusetts Inst. of Tech., Cambridge). *Foreign Policy*; No. 42, 125-140 (Spr 1981).

Disruptions in nuclear trade during the 1970s caused by the US and other countries trying to strengthen the control of nuclear activities eroded confidence in the market and strained traditional political alliances. A reinvigorated international nuclear regime that assures legitimate access and a consensus must be diplomatic priorities, but a new approach is needed to separate civilian from weapons programs. A review of previous non-proliferation efforts suggests that the US, Canada, and Australia should now initiate the movement with a series of bilateral discussions among themselves and then with other suppliers. The three would reaffirm global nuclear trade and offer to remove their own harsh export policies. A uniform interpretation should be given to all supply contracts, and the penalty for not abiding by the rules for either vendor or customer should be exclusion from international nuclear trade. (DCK)

5383 (DOE/ET/46608-1) High-level nuclear-waste disposal: information exchange and conflict resolution. Hadden, S.G.; Chiles, J.R.; Anaejionu, P.; Cerny, K.J. (Department of Energy, Washington, DC (USA)). Jul 1981. 237p. NTIS, PC A11/MF A01. Order Number DE81028818.

The research presented here was conceived as an exploration of the interactions among parties involved in the resolution of the high-level radioactive waste (HLW) disposal issue. Because of the major differences in the nature of the interactions between levels of government, on the one hand, and between government and the public, on the other hand, this study is divided into two primary areas - public participation and intergovernmental relations. These areas are further divided into theoretical and practical consider-

ations. This study is the product of a workshop held at MIT above as well as the interaction of the various participants. Public participation is addressed from a theoretical perspective in Part II. In Part 3 an essentially pragmatic approach is taken drawing on experiences from similar exercises. These two aspects of the study are presented in separate parts because the authors worked largely independently. Intergovernmental relations is treated in Part 4. The treatment is organized as two Sections of Part 4 to reflect the authors' close interaction which yielded a more integrated treatment of the theoretical and practical aspects of intergovernmental relations. Detailed recommendations and conclusions appear in the final subsections of Parts 2, 3, and 4. Part 5, Summary and Conclusions, does not reiterate the detailed conclusions and recommendations presented in previous parts but rather expresses some general perceptions with respect to the high-level waste disposal issue. A brief review of the Table of Contents will assist in visualizing the detailed format of this study and in identifying the portions of greatest relevance to specific questions. A detailed Subject Index and an Acronym Index have been included for the reader's convenience.

5384 Prevention of nuclear war. Lifton, R.J. *Bulletin of the Atomic Scientists*; 36: No. 8, 38-43 (Oct 1980).

Physicians are exercising their responsibility as leaders in their efforts to prevent nuclear war. Death for Hiroshima survivors was experienced in four stages: the immediate impact of destruction, the acute impact of radiation, delayed radiation effects, and later identification as an atomic bomb survivor. Each phase had its physical and psychological impacts and negates Hiroshima as a model for rational behavior despite those who claim survival is possible for those who are prepared. The psychic effects of modern nuclear, chemical, and germ warfare need to be challenged with a symbolization of life and immortality. Studies of psychological reactions to the terror children felt during practice air-raid drills indicate that the fears can be suppressed and re-emerge in adult life as a linking of death with collective annihilation. Other themes which emerge are feelings of impermanence, craziness, identification with the bomb, and a double existence. Psychic numbing and the religion of nuclearism cause dangerous conflicts with the anxieties caused by increasing awareness of death. (DCK)

5385 (EMD-81-76) Further evaluation of the proposed interim consolidation of the Nuclear Regulatory Commission. (General Accounting Office, Washington, DC (USA)). 24 Jun 1981. 43p. General Accounting Office, Gaithersburg, MD. Order Number DE8104047.

The Chairman and the Ranking Minority Member, House Committee on Interior and Insular Affairs, asked GAO to answer nine questions on the proposed interim consolidation of the Nuclear Regulatory Commission (NRC). These questions sought additional information and explanation of matters discussed in GAO's September 11, 1980 report on the subject. GAO still believes both the proposed and an alternative NRC interim consolidation option could help strengthen NRC, but points out several unresolved issues.

5386 (GA-A-16272) Data management in a fusion energy research experiment. Glad, A.; Drobins, D.; McHarg, B. (General Atomic Co., San Diego, CA (USA)). Jul 1981. Contract AT03-76ET51011. 33p. NTIS, PC A03/MF A01. Order Number DE81027932.

Present-day fusion research requires extensive support for the large amount of scientific data generated, bringing about three distinct problems computer systems must solve: (1) the processing of large amounts of data in very small time frames; (2) the archiving, analyzing and managing of the entire data output for the project's lifetime; (3) the standardization of data for the exchange of information between laboratories. The computer system supporting General Atomic's Doublet III tokamak, a project funded by the United States Department of Energy, is the first to encounter and address these problems through a system-wide data base structure.

5387 High technology and the courts: nuclear power and the need for institutional reform. Yellin, J. (Massachusetts Inst. of Tech., Cambridge). *Harvard Law Review*; 94: No. 3, 489-560 (Jan 1981).

In this article Professor Yellin analyzes the performance of the courts when confronted with the important and complex issues

attending the commercial development of nuclear power. We draw three general conclusions from the analysis: (1) the failure of nuclear regulation indicates that substantive review of agency decision making is necessary; (2) the limitations of the courts' ability to understand the scientific and technological arguments inherent in the nuclear power cases suggest the need for hybrid legal and scientific oversight of technological decisions; and (3) procedural requirements of the adversary system tend to impede full presentation of the issues in nuclear power cases, again pointing to the need for new systems of review. Professor Yellin proposes creation of a permanent review board composed of masters trained in both science and law to which technological and scientific issues falling outside the special competence of the judiciary would be referred by the federal appellate courts.

5398 (GJO—01664) Statistical data of the uranium industry. (Bendix Field Engineering Corp., Grand Junction, CO (USA)). 1 Jan 1981. Contract AC13-76GJ01664. 97p. NTIS, PC A05/MF A01. Order Number DE81026863.

Data are presented on US uranium reserves, mineral resources, exploration, mining, drilling, milling, and other activities of the uranium industry through 1980. The compendium reflects the basic programs of the Grand Junction Office. Statistics are based primarily on information provided by the uranium exploration, mining, and milling companies. Data on commercial U_3O_8 sales and purchases are included. Data on non-US uranium production and resources are presented in the appendix. (DMC)

5399 Politics, plutonium, and energy interdependence. Marshall, W. *Electric Perspectives*; 1-13(Fal 1980).

Mr. Marshall feels that effective policies to prevent the proliferation of nuclear weapons must begin by acknowledging the fact that the weapons exist and that denial of access will cause resentment and further determination. The scientific community should participate through groups like the International Nuclear Fuel Cycle Evaluation (INFCE) to help realize peaceful uses of nuclear energy. A scheme based on interdependency is outlined for supplying uranium ore at fair prices and with reliable delivery. The scheme could work if the US provides the leadership and sets an example. Mr. Marshall supports the position of a Japanese colleague, Tomaki Ipponmatsu, who argues that energy needs to be treated on a global basis to satisfy simultaneously the aspirations of the advanced and developing world. (DCK)

5390 (ORNL/SUB—7605/12-2) International safeguards for spent fuel storage. Kratzer, M.; Wonder, E.; Immerman, W.; Crane, F. (Oak Ridge National Lab., TN (USA); International Energy Associates Ltd., Washington, DC (USA)). Aug 1981. Contract W-7405-ENG-26. 73p. NTIS, PC A04/MF A01. Order Number DE81029896.

This report analyzes the nonproliferation effectiveness and political and economic acceptability of prospective improvements in international safeguard techniques for LWR spent fuel storage. Although the applicability of item accounting considerably eases the safeguarding of stored spent fuel, the problem of verification is potentially serious. A number of simple gamma and neutron non-destructive assay techniques were found to offer considerable improvements, of a qualitative rather than quantitative nature, in verification-related data and information, and possess the major advantage of intruding very little on facility operations. A number of improved seals and monitors appear feasible as well, but improvements in the timeliness of detection will not occur unless the frequency of inspection is increased or a remote monitoring capability is established. Limitations on IAEA Safeguards resources and on the integration of results from material accounting and containment and surveillance remain problems.

5391 (PB—81-124422) An economic analysis of the effects of regulatory delay on nuclear power plant construction. Technical report. Maloney, M.T.; Walsh, M.D. (Clemson Univ., SC (USA). Water Resources Research Inst.). Aug 1980. Contracts DI-14-34-0001-7086; DI-14-34-0001-8043. 105p. NTIS, PC A06/MF A01.

In order to evaluate the impact that any government regulation has on society, an accurate measure of the costs imposed by the regulation is essential. Current government estimates of the cost

of pollution control legislation have failed to include the costs of project delays that firms may experience when complying with such standards. Clearly, if these delays are the direct result of such legislation their costs should be included for a proper evaluation. The purpose of this report is to define and measure the true impact that construction delays have on the total project costs of a specific industry. The Nuclear Power Industry has been chosen to illustrate the problem. First, the industry is examined in terms of its economic and physical environment. A model is then developed to deal with the costs involved in the construction of a typical nuclear plant. The model is tested by regressing time and cost data of 31 completed plants to determine the impact that unanticipated delays have had on total project costs. These results indicate that such delays would increase the total project costs of a typical 1,000 mw plant by .8 percent per month in the initial stage of the project and 1.1 percent per month after actual construction begins.

5392 (PNL—3280) General safety assessment document for PNL-managed nonreactor nuclear facilities. Backman, G.E.; McMurray, B.J.; Nisick, N.P.; Richey, C.R. (Battelle Pacific Northwest Labs., Richland, WA (USA)). Jun 1981. Contract AC06-76RL01830. 123p. NTIS, PC A06/MF A01. Order Number DE81026321.

Included in this document are brief descriptions of Pacific Northwest Laboratory (PNL)-managed nonreactor nuclear facilities and delineation of the administrative controls, responsibilities, nuclear safety limits, support organizations, audit programs, training programs, emergency preparedness plans, radiation protection policy, and other operational requirements or vehicles that have been adopted to ensure the safety of each facility and/or the collective safety of all facilities. In addition, currently existing evaluations of public and employee risk from hypothetical accidents are summarized. Many PNL managed facilities contain quantities of radionuclides so small that potential accidents involving these radionuclides would have insignificant environmental effects. Also, potential accidents internal to these facilities, involving radioactive materials, would have only minor radiation consequences. These facilities have been grouped together. The available safety evaluations and the many years of good safety experience indicate that PNL-managed facilities are being and can continue to be operated without undue risk to the public or employees. The evaluations reported in this document also show that the intent of the environmental, safety and health program requirements of ERDA Manual Chapter 0531 is being met by PNL's overall safety policies and practices. However, compliance with the safety analysis or assessment documentation requirements has not been fully accomplished.

5393 (PNL—3774) INFEX guide: summary of US DOE plans and policies for international cooperation in the field of radioactive waste management. Harmon, K.M.; Kelman, J.A. (comps.). (Battelle Pacific Northwest Labs., Richland, WA (USA)). 1981. Contract AC06-76RL01830. 151p. NTIS, PC A08/MF A01. Order Number DE81028208.

The purpose of this document is to provide, in one source, an overview and summary of major international cooperative activities such as long-term personnel exchanges, planning of complementary R and D programs, and testing programs like the one at Stripa for use by DOE and DOE contractor personnel responsible for planning such programs. The contents are as follows: waste management-general, high-level waste immobilization; transuranic wastes; low-level radioactive waste; airborne wastes; waste isolation in geologic repositories; marine disposal; spent fuel storage; transportation; uranium mill tailings; decontamination and decommissioning; and appendices which are for bilateral waste management agreements; INFEX policies and procedures, DOE contractor personnel and international agencies.

5394 Energy inquiry of the West German Parliament. 4 ways into the future. Bauerschmidt, R.; Schmoelling, K. *Bild der Wissenschaft*; 18. No. 2, 80-87(Feb 1981). (In German).

Eminent representatives of the different camps of energy policies reached agreement in an inquiry commission on an joint energy plan for the eighties. They proposed pushing ahead with the use of nuclear energy until about 1990 as well as looking into the possibilities of saving energy up to that date. The knowledge thus obtained will, in the view of twelve of the 15 members of the com-

mission, then make it possible to finally solve the question of nuclear energy.

5395 Documents on the problems connected with the peaceful use of nuclear power. Facts, problems, interrelationships, basic concepts and principles underlying the opinions stated, comments by the church, literature references. Westmueller, H. Karlsruhe, Germany; Fachinformationszentrum Energie, Physik, Mathematik (Jun 1979). vp. (In German).

The Church's opinion in the nuclear controversy; it is intended as information material for work in the congregation and as an incentive for rethinking in the public. It does not take the side of either party.

5396 Directed-energy weapons: a juridical analysis. Fessler, E.A. New York, NY; Praeger Publishers (1979). 198p.

Superpower development of directed-energy laser or particle-beam weapons has strategic and legal implications. The rapid development of these weapons and the classified nature of the research make it difficult to evaluate these implications on a factual basis. International laws dealing with treaties and strategic-arms control and with armed conflict are applied to this issue to determine the permissibility of directed-energy weapons. As with the introduction of atomic and hydrogen bombs, these new weapons exemplify the inevitability of technological development and the need to allow public discussion to participate in the production, deployment, and use decisions that will follow. These decisions should be based on an evaluation of environmental and social impacts, national and international policies, and on military strategy. The study offers challenges and opportunities for creative policies. 371 references. (DCK)

5397 Managing nuclear wastes: the international connection. Handl, G. (Max-Planck-Institut f. Voelkerrecht u. ausl. oeffentl. Recht, Heidelberg, Germany). *Natural Resources Journal*; 21, No. 2, 267-314 (Apr 1981).

The global health and environmental aspects of nuclear waste management transcend national decision making and must be coordinated with the management policies of other nuclear-power countries. Assuming that reprocessing will continue at limited sites, ocean transport of radioactive materials introduces the need for preventive standards that will eliminate transnational pollution. This requires a level of cooperation beyond local and national management that will have to be initiated by individual countries and then replaced by joint international action. (DCK)

5398 Nuclear energy: the way ahead. Fells, I. (Univ. of Newcastle upon Tyne, Engl). *Energy World*; No. 79, 2-6 (Mar 1981).

The risks and benefits of nuclear power are assessed. It is supposed that the biggest task facing the nuclear power industry is one of educating the public and politicians in such a way that a balanced critical approach to nuclear power replaces the uninformed emotional response. Discussed are the problems of licensing nuclear power plants, transport and storage of spent fuel, reactor performance, the cost of nuclear power, its perspectives in developing countries, and some considerations on energy policy.

5399 Nuclear threat: can Europe build a common defense. Buis, G. *EUROPE*; No. 224, 10-12 (Mar 1981).

With declining credibility of American protection and continuing divisiveness among western European nations, controversy surrounds the acquisition of a nuclear force which could supply the ways and means of self-defense or just increase the military threat and cost. Defense depends on displaying a powerful, diversified, and credible nuclear armament. The author feels that Britain must be excluded from this force and problems between France and Germany and smaller countries settled before a common nuclear arms system can be set up. (DCK)

5400 Radioactive waste management. Flax, S.J. *Harvard Environmental Law Review*; 5, No. 2, 259-295 (1981).

This article examines the technical and legal considerations of nuclear waste management. The first three sections describe the technical aspects of spent-fuel-rod production, reprocessing, and

temporary storage. The next two sections discuss permanent disposal of high-level wastes and spent-fuel rods. Finally, legislative and judicial responses to the nuclear-waste crisis.

5401 Expected future development of nuclear energy until the year 2000. Arnold, O. (Rheinische Braunkohlenwerke A.G., Koeln (Germany, F.R.)). *Braunkohle*; 32, No. 10, 308-317 (Oct 1980). (In German).

After defining the recent energy situation of the Federal Republic of Germany and the potential development of nuclear energy which appears possible until the year 2000 the paper discusses the basic problems concerning world energy supplies as well as the future development of nuclear energy. According to the paper, France and the centrally planned economies have the most consistent development programmes with respect to nuclear energy, and are aiming at utilizing nuclear energy as a substitute for crude oil. Within a few years these countries will have - in terms of economic policy - important economic advantages over the industrialized nations which hesitate to take clear political decisions on utilizing nuclear energy to meet their energy demand, to secure satisfactory employment and to stabilize the public wealth independently of increasing energy prices. The paper indicates how to solve the needs of energy all over the world by taking into account utilization of nuclear energy.

5402 What if we reversed the What If syndrome. Hosmer, C. (Doub and Muntzing, Washington, DC). *Electric Perspectives*; 31-35 (Feb 1980).

Former Congressman Hosmer feels that US energy independence could be a reality if greater use were made of nuclear energy. He notes that the swift move toward commercial nuclear power was stopped first by a fear of new technology, and then by a rash of What If disaster fears which overlook a quarter of a century of safe and economical operation. If the What If litany is reversed, he thinks it is possible to regain the enthusiasm and optimism that made the nuclear era possible. Further, he observes that if commercialism had moved ahead faster, all the planned capacity would have been in place before the 1973 oil embargo and OPEC's impact would have been diminished. The US would have a better mix of energy sources, and nuclear-fueled electric power could replace oil in the transportation sector. Mr. Hosmer says the use of complementary technology, such as hydrogen fuels and off-peak energy storage, could reduce oil use even further. (DCK)

5403 Nuclear genie: beyond Faust, fate, and incantations. Maxey, M.N. (South Carolina Energy Research Inst., Columbia). *Electric Perspectives*; 37-47 (Feb 1980).

Dr. Maxey fears that public reaction to the anti-nuclear movement may have eliminated nuclear energy as a future option for the US. She notes that recurrent themes of the movement go beyond a genuine concern for remaining technical problems. Focusing on the personal and social threats associated with extravagant energy consumption, the campaign is waged by competing groups struggling for political power. They use non-technical issues to create divisiveness and drive a wedge between scientists and humanists. It is important to realize that activists and the media seek social change by portraying nuclear technology as a Faustian bargain and ignoring the benefits it offers. An ethical framework is needed in which counter arguments in support of nuclear energy can be examined and compared with the soft technologies and the concept of a risk-free world. Dr. Maxey feels that the bioethical approach, which recognizes that human action can inflict basic harm, is improperly applied to nuclear energy alone and needs to be re-evaluated; further, the US should lead in defining the benefits and harms inherent in all human actions and develop a philosophy of congruence which puts nuclear energy in its historical context. Because it is naive to think that the world can have a non-nuclear future, she says the US should provide leadership in international controls. 21 references. (DCK)

5404 Activities of the inquiry commission on the future nuclear policy. Findings and discussion. Michaelis, H. (Koeln Univ. (Germany, F.R.)); Commission of the European Communities, Brussels (Belgium); Kasper, K. (Rheinisch-Westfaelisches Elektrizitaetswerk A.G., Essen (Germany, F.R.)). *Abt. Kraftwerksanlagen. Energiewirtschaftliche Tagesfragen*; 30, No. 9, 658-667 (Sep 1980). (In German).

In June 1980 the official inquiry commission on the future nuclear policy, authorized by the German Bundestag, presented its report. The main statements are presented and discussed by the two authors.

5405 Present status and problems on extraction of uranium from seawater. (Atomic Energy Society of Japan). *Energy Developments in Japan*; 3: No. 1, 67-89 (Jul 1980).

Presented are the results of the studies conducted by the Research Committee of the Atomic Energy Society of Japan on extraction of uranium from seawater. Present status of the research in this field is reported. The subjects discussed include development of various adsorbents, extraction of uranium by flotation, various kinds of chemical analyses, some comparisons among different kinds of seawater contacting systems, the secondary concentrations, and the cost of assessment.

5406 Strategic offensive nuclear forces of the United States: a linear-programming model. Greynolds, O.L. Washington, DC; George Washington Univ. (1980). 217p. University Microfilms Order No. 81-11,327.

Thesis (Ph. D.).

The body of knowledge on international limitations of strategic nuclear forces is not generally available to the public. Portions of this knowledge probably will never be made public because of national-security classifications. Some of the information is not immediately useful to public and private decision-makers because, understandably, the analytic tools used to examine such issues are often complex, costly, and highly technical. By demonstrating how much understanding and insight can be attained using publicly available information and simplified analytic tools and evaluation techniques, this research has the potential for enhancing public understanding of strategic-nuclear-force issues. The quantitative analytic question - What value does linear programming have in assessing strategies for force mixes of strategic offensive nuclear military forces - is the research focus. Several subsidiary questions are also examined. International agreements, national nuclear strategies, and literature on regressions, theoretic games, simulations, and optimizing analytic forms are reviewed. The 1978 US strategic-nuclear-force mix of missiles and bombers is used to demonstrate primal solutions and post-optimal analysis techniques. Four evolutionary modifications of this 1978 Base Case Force are examined, and comparative analyses of 11 five forces are made. Enhanced methodologies - dual solutions, parametric analysis, and goal programming - are provided to demonstrate the power and flexibility of linear programming. It was found that linear-programming methodologies can provide a set of simple, useful, inexpensive, and credible models and tools that could be used by analysts and decision-makers, both public and private, to examine and to better comprehend and understand the profoundly significant issues surrounding the strategic offensive nuclear forces of the United States.

5407 US civil-defense decision-making: the Ford and Carter administrations. Kincade, W.H. Washington, DC; American Univ. (1980). 844p. University Microfilms Order No. 81-11,201.

Thesis (Ph. D.).

This work examines the regularities in US civil-defense policy and programs through the lens of the prevailing paradigms in decision-making theory: the rational actor model, the governmental or organizational model, the cybernetic model, the bureaucratic politics model, and the cognitive process model. The objectives are to improve understanding of US decision-making in connection with civil defense and to study the applicability of the various models to the civil-defense case, with a view to developing an integrated paradigm for governmental decisions on security issues. The study has five parts. The first reviews and analyzes current decision-making models and outlines a synthesis of the insights of existing paradigms, emphasizing the role of rational processes. The second part describes the continuing Western debate over nuclear strategy, reviews American perceptions of Soviet nuclear strategy, and contrasts American and Soviet civil defense in theory and practice. The third section describes and analyzes the evolution of US civil-defense policy and programs in the period 1945 to 1974. The integrated of the administrations of Ford and Carter regarding civil defense are examined in part 4. In the final section, US civil-defense decision-making is reviewed in terms of each of the existing models

or paradigms, to test their adequacy in explaining the recurring or nonrecurring phenomena. An alternative model - embracing elements of current paradigms but seeking also to remedy their tendency to reductionism - is suggested, based on the findings in the civil-defense case. The major conclusion of the research is that civil defense failed to achieve the levels of active public support required for successful and sustained mid-scale programs.

5408 International nuclear proliferation: multilateral diplomacy and regional aspects. Kapur, A. New York, NY; Praeger Publishers (1979). 397p.

Confidential interviews with about 200 officials at 18 nuclear research sites around the world form the background for this discussion of the proliferation issues as they affect the Nuclear Non-Proliferation Treaty (NPT). Critics of the NPT cite its narrow focus on horizontal proliferation and its failures in the areas of vertical proliferation, nuclear technology transfers, heavy-water-reactor systems, and safeguards. The international negotiations necessary to resolve these issues and the difficulty of reaching a global consensus indicate a need to restructure the U.S. decision process before diplomacy can progress. The book discusses the history and nature of proliferation and its relationship to multinational diplomacy, the problems of permanent and workable safeguards, and regional political ramifications in the creeping dependencies of South Asia, apartheid in South Africa, militarization in Japan, and the nuclearization of Brazil and Argentina. The analysis concludes that central issues were not settled by the NPT and that U.S. failures to speak without consulting allies may mean that a bilateral rather than multinational approach should be tried. 105 references, 5 figures, 12 tables. (DCK)

2907 Transport And Storage

5409 Off-peak storage heating: the British experience. Everitt, N. (Heating and Ventilating Review, Croydon, England). *Electric Light and Power*; 59: No. 7, 56, 58 (Jul 1981).

A British effort to reduce peak loads by using off-peak periods for storage heating systems found that most buildings lack adequate insulation to retain the stored heat. Storage radiators, fan heaters, and warmed structural elements are the most common forms. New, slimmer heater designs are more responsive to control. Design features and insulation requirement are described. 4 figures. (DCK)

5410 Rate structure of unit coal trains in the 1970s. Friedlaender, A.F.; Ferguson, W.L.; Sloss, J. (Massachusetts Inst. of Tech., Cambridge). *Journal of Industrial Economics*; 28: No. 3, 269-286 (Mar 1980).

This paper postulates that the railroads act like profit-maximizing monopolists and develops a reduced-form hedonic rate equation consistent with this behavior, fitting the equation to the pre-1973 situation; existing traffic patterns after adjustments to oil and gas constraints; and one that represents the new Western coal shipments. Section II presents the derivation of a rate model under monopoly conditions and considers the extent to which it is possible to isolate the cause of changes in the rate structure. Section III presents empirical results and argues that the rate structure of Western coal is fundamentally different from the existing Eastern rate structure. Section IV provides a brief summary and conclusion and considers some areas of future research. (PSB)

2908 Waste Heat Utilization

REFER ALSO TO CITATION(S) 5364

5411 (ANL/CNSV-TM-67) Oasis code application to proposed Argonne National Laboratory cogeneration plant. Bingham, D.J.; Leslie, N.P. (Argonne National Lab., IL (USA)). Jun 1981. Contract W-31-109-ENG-38. 135p. NTIS, PC A07/MF A01. Order Number DE81025869.

A computer program, OASIS (Optimization and Simulation of Integrated Systems), has been developed by Argonne National Laboratory to provide detailed representations of the processes and operating conditions in central plants. It contains an extensive li-

library of generic component subroutines that model representative equipment using part-load performance curves. New technologies may be modeled by adding FORTRAN written subroutines in the job input stream. The equipment performance and economic data already included are easy to modify, so that almost any plant configuration and set of operating conditions may be modeled. The quasi-steady-state simulation is based on user-defined or optimal operation in response to user-supplied demands. The use of OASIS is described for an evaluation of the proposed cogeneration plant at Argonne National Laboratory.

5412 (DOE/CE/10328—1) California cogeneration and small-power-production pricing study. (California Public Utilities Commission, San Francisco (USA)). Apr 1981. Contract FG01-80CS10328. 55p. NTIS, PC A04/MF A01. Order Number DE81028116.

The California Public Utilities Commission conducted a study to assist public utilities commissions nationwide in implementing policy for cogeneration and small power production technologies. The effort consisted of studies and hearings related to avoided-cost based pricing, identification and removal of regulatory barriers, and workshops to assist potential cogenerators. The primary focus of this study is cogeneration, however, the analysis of pricing guidelines also address as the applicability for small power production facilities as well as their unique characteristics. The study is divided into four segments, or tasks each of which focuses on separate areas for review and/or analysis. This report represents Task I, and consists of a case history documentation of authorized prices and contract terms for cogenerators and small power producers in California resulting from Commission action in 1979. Subjected covered are: marginal-cost offers versus shared benefits (theory); marginal energy and capacity costs; requirements for capacity payments; simultaneous purchase and sale; new qualifying facilities versus old qualifying facilities; rates for standby service, maintenance, and interruptible power; wheeling; auxiliary power sources; utility ownership and joint benefits; rate of return reward/penalties; and interconnection costs.

5413 (DOE/ET/12866—8-Vol.1) Residual-energy-application program: EAST-facility requirements document. Yngve, P.W.; Zander, F.H. (South Carolina Energy Research Inst., Columbia (USA)). 31 Jul 1981. Contract AC09-77ET12866. 85p. NTIS, PC A05/MF A01. Order Number DE81027536.

An Energy Applied Systems Test (EAST) Facility will be constructed at the Savannah River Plant to serve as the primary systems test and evaluation facility for the Department of Energy's Residual Energy Applications Program (REAP). The REAP goal is to stimulate the private sector to use available residual heat currently being dissipated. The objectives of the EAST Facility are to perform research and development on heat energy recovery and conversion equipment; establish high confidence in system performance, system availability, and system operating, maintenance, and material costs; and provide a national competence in technologies required for the installation and operation of heat recovery systems. The purpose of this document is to provide design specifications for the EAST Facility. Volume I presents an initial testing capability recommended for EAST and design specifications are provided for the physical plant and major test support systems. Five options are included for tailoring the full-up testing capability to reduce costs of the core facility.

5414 (DOE/ET/12866—8-Vol.2) Residual-energy-application program: EAST-facility requirements document. Yngve, P.W.; Zander, F.H. (South Carolina Energy Research Inst., Columbia (USA)). 31 Jul 1981. Contract AC09-77ET12866. 237p. NTIS, PC A11/MF A01. Order Number DE81027489.

An Energy Applied Systems Test (EAST) Facility will be constructed at the Savannah River Plant to serve as the primary systems test and evaluation facility for the Department of Energy's Residual Energy Applications Program (REAP). The REAP goal is to stimulate the private sector to use available residual heat currently being dissipated. The objectives of the EAST Facility are to perform research and development on heat energy recovery and conversion equipment; establish high confidence in system performance,

system availability, and system operating, maintenance, and material costs; and provide a national competence in technologies required for the installation and operation of heat recovery systems. The purpose of this document is to provide design specifications for the EAST Facility. Volume I presents an initial testing capability recommended for EAST and design specifications are provided for the physical plant and major test support systems. Volume II contains detailed descriptions of seven potential test articles which represent a wide range of types and sizes of heat recovery systems. This volume discusses EAST operations, including test planning, test policies, systems testing, and facility organization and staffing. Additionally, information is included on a preliminary site analysis for the EAST Facility and other test support system requirements are described.

5415 (DOE/TIC—11486) Environmental assessment on industrial cogeneration demonstration plant at the Riegel Textile Mill site, Ware Shoals, South Carolina. (Argonne National Lab., IL (USA)). Jun 1981. Contract W-31-109-ENG-38. 74p. NTIS, PC A04/MF A01. Order Number DE81030179.

The paper examines the potential environmental, health and safety, and socioeconomic impacts of the proposed industrial cogeneration demonstration plant at the Riegel Textile Corporation's mill in Ware Shoals, South Carolina. The proposal involves installing and demonstrating cogeneration of process steam and electricity by topping process steam. Section I discusses the need and purpose for the proposal. Section II discusses alternatives including the proposed action. Alternatives including the proposed cogeneration system discussed are no action; replacement of one existing boiler, omitting cogeneration; system alternatives (cogeneration bottoming cycles, alternative cogeneration topping cycles. Section III provides past and present data on those aspects of the local environment which could be affected by the proposed actions. Items discussed are topography and climatology, geology and soils; air quality; water resources and quality; ecological resources; land use plans and policies; socioeconomic setting; health and safety; utilities and services; energy resources; cultural resources and aesthetics and details on these items are presented in Section IV. A summary of impacts associated with, impact of alternatives to, and mitigating measures to the proposed action are also presented in Section IV. Discussions on unavoidable adverse environmental effects; irreversible and irretrievable commitment of resources; relationship of land use plans, policies, and controls; and relationship between short-term use of environment and maintenance and enhancement of long-term productivity conclude Section IV. (MCW)

5416 (PNL-SA—9164) Waste heat and chill storage in aquifer systems. Eliason, J.R. (Battelle Pacific Northwest Labs., Richland, WA (USA)). 1981. Contract AC06-76RL01830. 10p. (CONF-810545—6). NTIS, PC A02/MF A01. Order Number DE81028016.

From 3. conference on waste heat management and utilization; Miami, FL, USA (12 May 1981).

Seasonal storage of thermal energy in aquifers has the potential to make a significant near-term contribution towards relief of the national energy shortage. Winter chill, summer heat, and various forms of industrial waste heat and chill can be stored for future demand, thus reducing the need for generating primary energy. This seasonal storage of heat and chill in aquifer systems is being assessed as part of the Seasonal Thermal Energy Storage (STES) Program. The STES Program is managed by the Pacific Northwest Laboratory (PNL) for the US Department of Energy (DOE). The program is designed to conduct research and development studies required to provide the technical base for implementation of the Aquifer Thermal Energy Storage (ATES) concept.

5417 Outside investors spark growth of cogeneration. Baum, D. *Energy User News*; 6: No. 29, 1, 12-13(20 Jul 1981).

Third-party investors are providing the capital for cogeneration equipment for companies that would otherwise be unable or unwilling to raise the capital and interest. The investors build a cogeneration plant at the user's site and the user rents the plant or buys the output. This type of arrangement became feasible with the passage of the Public Utility Regulatory Policies Act (PURPA) of

1978, although constitutionality lawsuits are moderating the response. Investors are encouraged by tax credits for investments, energy conservation, and equipment depreciation. Cogeneration-equipment manufacturers as well as the big lending institutions can act as third-party investors. (DCK)

5418 Rational use of energy helps saving. Waste heat from industrial processes and refuse destruction. *VDI-(Verein Deutscher Ingenieure) Nachrichten*; 34: No. 40, 13(3 Oct 1980). (In German).

Balance was struck on the plans forwarded by the Federal Ministry of Research and Technology at the third status seminary, Rational use of energy, held in Stuttgart on September 22nd to 24th. Central heating supply techniques as well as the utilization of waste heat from power plants and industrial processes for district heating networks are investigated and developed in this program as well as components for decentral heat supply, such as block heat power plants, heat pumps and low power burners.

5419 Optimal dimensioning of district-heating networks. Koskelainen, L. *Fernwaerme International*; 9: No. 2, 84-90(Apr 1980).

The tendency to increase combined heat and power production in the energy supply of communities has intensified building of district heating systems in many countries. Extending of the networks requires enormous investments every year. Because the economical age of the pipelines is rather long, and the heat load as well as the supply systems develop all the time, the network should be carefully dimensioned according to the economical optimality, and the investments should be timed so that the heat demands are always met. This article reviews the analysis and optimization methods developed for large district heating networks. The network simulation model is used for calculating the flows and pressure distributions in an existing or imagined network. It may be used for checking the functioning of intuitively dimensioned networks in different operating conditions. The optimization model is used for large-scale planning of partially built or completely new networks or their main pipelines. The program finds the optimum diameters of pipelines or deletes unnecessary connections.

2910 Conservation

REFER ALSO TO CITATION(S) 5329, 5369, 5485, 5487, 5488, 5572, 5605, 5630, 5687

5420 (CONF-810812—32) Annual cycle energy system experimental performance and national applicability. Baxter, V.D. (Oak Ridge National Lab., TN (USA)). 1981. Contract W-7405-ENG-26. 6p. NTIS, PC A02/MF A01. Order Number DE81028570.

From IEEEC conference; Atlanta, GA, USA (9 Aug 1981). A single-family residence in Knoxville, Tennessee has been used to demonstrate the energy conserving potential of the Annual Cycle Energy System (ACES). For the past two years the performance of the ACES has been compared with that of two different air-to-air heat pumps in an identical house, the control house. The two heat pumps had ARI-rated COPs of 2.46 and 3.11 at 8.3°C, representing both standard and best available heat pumps now on the market. Hot water for the control house was supplied by an electric resistance heater each year, while hot water for the ACES house was supplied by the ACES mechanical package. Performance results for the period December 1978 through September 1979 show that the ACES consumed 6719 kWh of electricity for an annual coefficient of performance (ACOP) of 2.80. The control house (with the ARI-2.46 heat pump) consumed 12,853 kWh of electricity, yielding an ACOP of 1.42. For December 1979 through September 15, 1980, the ACES consumed 6447 kWh of electricity for an ACOP of 3.08 while the control house, using the ARI-3.11 heat pump, consumed 11,358 kWh for an ACOP of 1.73. The ACES has achieved nearly all of its theoretical performance predictions and has verified its design criteria. This system has delivered residential heating and cooling services while consuming only 57% as much electricity as the best conventional alternative tested. Computer studies have shown the ACES to be applicable to all US climatic zones except those with very low heating needs.

5421 (DOE/CS/40059—T1) Development of a biomass energy system for drying corn. Final report. 1 July 1978-30 June 1981. Buchele, W.F.; Claar, P.W. II; Marley, S.J. (Iowa State Univ. of Science and Technology, Ames (USA), Dept. of Agricultural Engineering). 1981. Contract AS02-78CS40059. 109p. (COO—4916). NTIS, PC A06/MF A01. Order Number DE81029027.

Over a 3 year period, research has been conducted on the development of a direct-combustion furnace for burning agricultural crop residue. This report summarizes the progress that has been made. During this time period, the following research efforts have been carried out: (1) evaluation of the design and operating parameters of the Iowa State University Agricultural Engineering incinerator-type furnace; (2) evaluation of existing furnace types for application to burning agricultural crop residue; (3) design and fabrication of a direct-combustion, biomass-fueled furnace; (4) evaluation of the direct-combustion, biomass-fueled furnace; (5) redesign and fabrication of a second direct-combustion, biomass-fueled furnace; (6) evaluation of the second direct-combustion, biomass-fueled furnace; (7) redesign and fabrication of a third direct-combustion, biomass-fueled furnace; (8) cooperation with manufacturers for marketing furnaces for farmstead applications; (9) economic and energy analysis for the utilization of agricultural crop residue on a cornbelt farm; and (10) determination of the quantities of corn residues produced on a cornbelt farm and the effect of residue removal harvest rates on the amount of cover remaining and the resulting impact on soil erosion hazards.

5422 (DOE/CS/50069—T1) Responses to comments of air transport association of America on aircraft towing feasibility study. (Peat, Marwick, Mitchell and Co., San Francisco, CA (USA)). Jun 1981. Contract AC01-79CS50069. 112p. NTIS, PC A06/MF A01. Order Number DE81029834.

A preliminary assessment of the constraints on and feasibility of extended aircraft towing between airport runways and terminal gate areas with engines shutdown is made. Past aircraft towing experience and the state-of-the-art in towing equipment are reviewed. Safety and operational concerns associated with aircraft towing are identified, and the benefits and costs of implementing aircraft towing at 20 major US airports are analyzed. It was concluded that extended aircraft towing is technically feasible and that substantial reductions in aircraft fuel consumption and air pollutant emissions can be achieved through its implementation. It was also concluded that, although capital and operating costs associated with towing would be increased, net savings could generally be attained at these airports. Because of the lack of past experience and the necessity of proving the cost effectiveness of towing concept, a demonstration of the feasibility of large-scale aircraft towing is necessary. The study evaluates the suitability of the 20 study airports as potential demonstration site and makes recommendations for the first demonstration project.

5423 (DOE/R5/10248—T1) Earth-sheltered industrial utility park. Final report. (Cumberland Development Corp., WI (USA)). Apr 1981. Contract FG02-80R510248. 78p. NTIS, PC A05/MF A01. Order Number DE81028667.

The potential to develop the Cumberland (Wisconsin) industrial park site using earth-integrated techniques is discussed. The concept feasibility study concerned the site, the land-use plan, and building types. An assessment of energy use in the Cumberland community for 1979 and 1980 was made by compiling sales data from the various suppliers of gasoline, diesel, electricity, natural gas, and other fuels. A resource and technology assessment of biomass feedstocks for a possible community scale bioenergy facility was made. Details of each element of the study are presented and conclusions are summarized. (MCW)

5424 (NP—1904010) Residential site design and energy conservation. Part 1: general report. (Ministry of Housing, Ottawa, Ontario (Canada)). Jan 1981. 158p. NTIS (US Sales Only), PC A08/MF A01. Order Number DE81904010.

The purpose of this study is to determine the energy costs that can be saved by a subdivision design format related to energy conservation that is reasonably acceptable in marketing and aesthetic terms. The site chosen for the study is one of 163 acres (65.2 hectares) in Guelph. Six subdivision layouts are designed to densi-

ties ranging from 6.5 to 13.6 units per gross acre (1058 to 2232 units) or 16.25 to 34 units per gross hectare. Hourly radiation temperature, and wind characteristics for a year constitute the local climate data base. Six house types (from detached to apartment units) and seventeen basic house designs (mostly picked at random) are used. The method for calculating the net heat load and an analysis of the results are presented. A study was made of the possible transportation energy consumption in the subdivision. Development costs of the area are discussed. The fiscal impact of the subdivision on the municipal and school finances is briefly analyzed. Total annual heat loads for alternative plans adjusted to the energy source and the related furnace efficiency are given. The study shows that by way of the selection of the more energy efficient traditional house designs, orientation of buildings to maximize solar transmission, and landscaping to reduce the effect of wind, there is a possible residential space heating energy saving of up to 20% for a low density housing development. (MCW)

5425 (NYSERDA-80-27) Energy conservation in museums. Ucar, M.; Doering, G.C. (Syracuse Univ., NY (USA). Inst. for Energy Research). Jul 1980. 172p. New York State Energy Research and Development Authority, Albany. Order Number DE81903901.

An overall assessment of energy conservation in museums in New York is made in view of the special environmental considerations involved. The special relative humidity, temperature, and lighting requirements of museums were studied extensively. An energy consumption data base was formed with actual energy use data obtained from over fifty institutions across the state. The computerized energy consumption data base compiled covers an extremely wide range of energy usage levels. On-site energy consumption ranged from approximately 20,000 to 400,000 Btu/ft² year. The data base includes small rural institutions and large metropolitan museums, historic and modern structures, seasonal and year-round museums, single buildings and collections of buildings, single-story buildings and multiple-story buildings, an aquarium, and a zoo. Thus, it is difficult to identify trends in the energy consumption data and to make correlations with such parameters as age, type, size, etc. Walk-through or mini energy audits were performed on ten museums located in various parts of New York State. This project also included a thorough study of all potential funding sources to which museums can apply for financing energy conservation measures. Sources of technical assistance and information were also identified. (MCW)

5426 (ORNL/CON-75) Effect of forced ventilation on house infiltration. Levins, W.P. (Oak Ridge National Lab., TN (USA)). Aug 1981. Contract W-7405-ENG-26. 40p. NTIS, PC A03/MF A01. Order Number DE81029118.

Tests were conducted over a period of 18 months at a house near Knoxville, Tennessee, to determine the effect of forced ventilation on the house infiltration rate. An outside-vented electric dryer was used as the power vent. The testing was carried out during a variety of weather conditions. The tracer gas technique using sulfur hexafluoride was employed to measure infiltration rates. A correlation equation was developed based on measured data that relates the change in the house infiltration rate to the dryer vent rate. The correlation equation has the form of an inverse exponential curve that shows a greater increase in the infiltration rate of a tightly constructed house than of a loosely constructed house. Calculations were made for 17 cities across the United States showing the effect of dryer location on house energy consumption.

5427 (P-102-80-008) California Energy Demand 1980 to 2000: revised forecast for consideration in the proceedings on the Third Biennial Report. Volume II. Detailed appendices. (California Energy Resources Conservation and Development Commission, Sacramento (USA)). Nov 1980. 551p. California Energy Commission, Sacramento, CA. Order Number DE81903659.

Data are presented on electric, natural gas demand forecasts for agriculture and industry. Residential and commercial sectors are also detailed. (PSB)

5428 (PB-81-111924) Passenger car fuel economy: EPA and road. A report to the Congress. Final report. Murrell, D. (Environmental Protection Agency, Ann Arbor, MI (USA). Motor Vehicle Emission Lab.). Sep 1980. 306p. NTIS, PC A14/MF A01.

In accordance with the National Energy Conservation Policy Act of 1978, Title IV, Part 1, section 404, this report has two objectives: (1) to determine the degree to which 'EPA MPG' figures used in fuel economy labels and gas mileage guides provide realistic estimates of average in-use fuel economy, and (2) to provide a technical basis for revising, as necessary, the label and guide MPG figures to better agree with average in-use fuel economy, and, further, to provide information on the degree to which specific in-use fuel economy influences can cause departures from the standardized label and guide fuel economy figures.

5429 (PNL-3883) Sampling design for the 1980 commercial and multifamily residential building survey. Bowen, W.M.; Olsen, A.R.; Nieves, A.L. (Battelle Pacific Northwest Labs., Richland, WA (USA)). Jun 1981. Contract AC06-76RL01830. 98p. NTIS, PC A05/MF A01. Order Number DE81028783.

Details of a proposed sample design for the 1980 Commercial and Multifamily Building Energy Performance Survey are presented. The objective of the survey is to assess the extent to which new building design practices comply with the proposed 1980 Energy Budget Levels for Commercial and Multifamily Residential Building Designs (DEB₈₀). The procedure will be to: identify a small number of building types which account for the majority of commercial buildings constructed in the U.S.A.; conduct a separate survey for each building type; and include only buildings designed during 1980. For each building in the survey, the Design Energy Consumption (DEC₈₀) will be determined by the DOE2.1 computer program. The quantity $X = (DEC_{80} - DEB_{80})$, will be calculated for each building as a measure of its compliance with DEB₈₀. These X quantities will then be used to compute sample statistics. Inferences about nationwide compliance with DEB₈₀ may then be made for each building type. This report provides details of the population, sampling frame, stratification, sample size, and implementation of the sampling plan.

5430 (TVA/OP/ECR-81-19) Program summary. (Tennessee Valley Authority, Chattanooga (USA). Office of Power). Apr 1981. 45p. NTIS, PC A03/MF A01.

The Tennessee Valley Authority has initiated energy conservation programs aimed at eliminating waste and to help consumers hold their overall energy use to the amount that is actually needed. An overview, features, status, and cost are discussed for research and demonstration programs and programs that have been implemented in energy conservation and management, solar applications, load management, and dispersed power production. (MCW)

5431 (UCRL-85526) Future of electricity for automobiles: advanced electric vehicle concepts. O'Connell, L.G. (Lawrence Livermore National Lab., CA (USA)). 29 Jul 1981. Contract W-7405-ENG-48. 14p. (CONF-811010-3). NTIS, PC A02/MF A01. Order Number DE81028235.

From 6. electric vehicle council symposium; Baltimore, MD, USA (21 Oct 1981).

A large and growing effort involving both the federal government and industry is underway to develop and commercialize highway vehicles that utilize electricity. The electricity they use can be generated from nonpetroleum fuels. The Department of Energy, through its Electric and Hybrid Vehicle Program, is the principal federal agency involved in this work. The goal is to replace petroleum-consuming vehicles now operating on our roadway system with ones that utilize electricity as a primary fuel. However, commercially available electric vehicles (EV) do not compete on a performance (acceleration and range) or cost basis with comparably sized internal combustion engine vehicles. Although today's electric vehicles will certainly find some commercial acceptance, we need an automobile with general-purpose capability if we are to appeal to the larger market. I have labeled such an automobile the Advanced Electric Vehicle. Thus by definition, the Advanced Electric Vehicle is an automobile capable of filling the general-purpose role of today's gasoline-powered car and uses electricity as its principle

fuel. It is either an EV, hybrid vehicle (HV), or some other nonpetroleum electricity-based system, such as a fuel cell vehicle (FCV). Is this Advanced Electric Vehicle in our future. To determine this we need to have an understanding of what may be possible. Performance criteria for such a vehicle are presented and, in addition, various concepts that may be suitable for this vehicle are identified—their likely capabilities are discussed as well as the difficulties that must be overcome prior to commercialization in each case.

5432 Energy savers: some work, some don't, some are just plain gyms. *Changing Times*; 35: No. 8, 57-59 (Aug 1981).

While many products, systems, and techniques to help to save energy, consumers must be cautious and well-informed enough to avoid con artists. Various types of offerings include gasoline savers, special motor oils, heat pumps, solar equipment, insulation, gas heat conversions, heaters and stoves, electric power savers, sun reflectors, and windmills. Consumer-protection authorities have investigated claims made in each of these categories. Publications and hotlines provide more information. (DCK)

5433 Grants, costs spur hospital energy-conservation efforts. *Vail, B. Energy User News*; 6: No. 30, 1, 10/27 Jul 1981).

High energy costs are encouraging hospitals and health-care facilities to invest in custom-tailored energy-management systems. Federal matching grants and other financing incentives are counteracting the reluctance of managers with third-party reimbursement to invest in energy conservation, but federal budget cuts eliminate or reduce these funds. Conservation steps taken by hospitals are constrained by the need to maintain reliable power to emergency and intensive-care areas. Load-shedding for air-conditioning systems and heat recovery are the major areas for savings, along with computer controls and standardized energy accounting. The widespread use of low-cost natural gas has delayed some of the economic impact of energy costs for most hospitals. Case histories illustrate the savings available to older facilities. (DCK)

5434 Energy plan: prices to spur conservation. *Betts, M. Energy User News*; 6: No. 30, 5, 27/27 Jul 1981).

A statistical forecast by the National Energy Policy Plan (NEPP) projects that, in response to energy prices, commercial buildings will make significant progress in conserving energy and replacing oil with electricity and renewable resources, while industrial operations will increase output per unit of energy, continue to improve energy efficiency, and switch to coal-fired boilers. The document cautions that computer projections are not to be construed as price predictions. Population and economic growth will cause a slight overall increase in energy use, but much of this growth will have been offset by energy-saving equipment and energy-efficient buildings. The NEPP differs from the Carter Administration's National Energy Plan by relying on market forces rather than government programs. Liberals are critical that the new policy forces conservation to compete with government-assisted oil, gas, nuclear, and synthetic fuels industries. The NEPP also supports the substitution of coal only when it is economically feasible. (DCK)

5435 Court overrules insulation standard set by Pennsylvania utility. *Ruth, P. Energy User News*; 6: No. 29, 4, 6/20 Jul 1981).

A Pennsylvania Court rules against a utility requirement that new buildings exceed the insulation standards of the state thermal lighting code, which complies with the ASHRAE 90 standards accepted nationally. The utility standard would have withheld power supplies to new buildings that fail to meet the utility's efficiency standard. The Pennsylvania Public Utilities Commission plans to appeal the ruling. At issue was the mandated R-30 ceiling insulation level for new residences compared to the state-required R-19 level. The utility does not specify equipment efficiencies, but the ruling would not prevent its doing so. (DCK)

5436 Upgrading energy efficiency requires tax incentives. *Zimmer, M.J. (Wickwire, Gavin & Gibbs, Washington, DC). Energy User News*; 6: No. 29, 22/20 Jul 1981).

The new administration is shifting energy-conservation policy from the recent legislative pace to favor market forces and

financial incentives. Energy supply is currently getting a higher priority on the grounds that people, not government, should promote energy efficiency. Whether this approach will work is questionable because the users who will benefit most from energy-efficient technology lack the necessary capital. Financial barriers to efficiency investments need to be addressed because they leave too many questions unanswered. Energy policy needs to examine the appropriate sector uses of petroleum and its substitutes, on-site cogeneration, renewable resources, and synthetic fuels more carefully. Energy efficiency can lengthen the transition time before alternatives to oil are required. (DCK)

5437 Retail battle for conservation dollars. *McCaughy, J. Energy Daily*; 9: No. 135, 2-4/16 Jul 1981).

Large companies are entering the profitable retail market with conservation equipment and services that will compete for a share of the \$10 to \$80 billion Americans will spend on energy efficiency this year. Energy centers and clinics are also opening around the country to market products and compete with the utilities for energy audit business. The new retailing efforts are counting on homeowners' willingness to spend money to lower their energy bills. The smaller companies hope to hold their own against competition from large corporations. (DCK)

5438 Who will set the standards for groups that set industry product standards. *Singer, J.W. National Journal*; 12: No. 18, 721-725 (3 May 1980).

The author discusses the stifling effects resulting from standards written and published by about 400 private groups, such as American Society for Testing Materials, Society of Automotive Engineers, American Nuclear Society, Occupational Safety and Health Administration, etc. He cites the fact that 90% of the Food and Drug Administration's standards set for about 1200 medical devices will be based on voluntary standards. Local and state governments also incorporate voluntary standards to the distress of any new company or inventor wanting to enter competitive marketing. The author cites examples that Congress has little power over these voluntary standard-setters. (PSB)

5439 Economics of solar energy and conservation systems. Volume III. Energy management and conservation. *Kreith, F.; West, R.E. (eds.). Boca Raton, FL; CRC Press, Inc. (1980). 277p.*

Separate abstracts were prepared for five chapters in this book. (LEW)

5440 Industrial energy management. *Rohrer, W.M. Jr. pp 97-171 of Economics of solar energy and conservation systems. Volume III. Energy management and conservation.* *Kreith, F.; West, R.E. (eds.). Boca Raton, FL; CRC Press, Inc. (1980).*

The potential for fuel conservation in industry is explored. Gaining commitments in the organizational structure and organizing energy conservation programs are discussed. Energy conservation goals, process efficiency, and alternate fuels are discussed. The energy audit and energy information system are described, and data collection, extraction of information from gross energy consumption data, and the internal audit are covered. In-plant metering is considered. The technology of energy conservation is reviewed, including improved housekeeping, combustion control, waste-heat management, HVAC, unit processes, and schedule optimization. Cogeneration of steam and electricity, computer-controlled energy management, and waste-heat recovery equipment are discussed. A sample study is given. Opportunities to conserve energy such as recuperations of a heat-treat furnace and a cupola and heat recovery from a cupola and air compressor cooling water are considered. Some investments are listed against their present value, and recommendations are made. (LEW)

5441 Electrical power management in industry. *Smith, C.B. pp 173-205 of Economics of solar energy and conservation systems. Volume III. Energy management and conservation.* *Kreith, F.; West, R.E. (eds.). Boca Raton, FL; CRC Press, Inc. (1980).*

The use of energy, electricity in particular, in industry is discussed. Electricity end uses include electric drives, electrolysis,

process heat, HVAC, and lighting. Phases of setting up an industrial management program are discussed. These are management commitment, audit and analysis, and implementation. Electric load analysis is discussed. Energy management strategies for industry are broken down by use. Management of demand is considered. (LEW)

5442 Economic analysis of the feasibility of the retort pouch for packaging fruit and vegetable commodities in an environment of rising energy prices. Williams, J.R. East Lansing, MI; Michigan State Univ. (1980). 262p. University Microfilms Order No. 81-12,178.

Thesis (Ph. D.).

Three systems models are used to estimate the costs associated with two existing canning systems and their possible replacements: a retort pouch or a can-packaging system. A model is used to estimate the costs associated with acquiring and maintaining a new technologically advanced set of durable equipment for processing retort pouches. Another is used to estimate these costs for a new canning-equipment complement. The models also use the data in an economic-replacement routine to determine the optimal economic life of the new durable-equipment complements which could replace the existing canning-equipment complement. The models are used for estimating the cash flows associated with other operating requirements of the new replacement packaging systems such as container, freight, labor, and energy expenses. A third model is used to estimate the costs associated with the operation of the existing can packaging systems and the maintenance of their durable equipment complement. The total costs of each system are then compared to determine the minimum costs packaging system. Different operating scenarios which consist of various combinations of equipment components, energy requirements, container prices, energy prices and other input prices are used to generate a range of operating costs for comparing the systems costs under a range of feasible operating conditions. Energy savings in processing the pouch versus the can is of little significance, but the comparatively lower amount of energy used in transportation and container manufacture has an important role in the cost-effectiveness of the retort pouch. A substantial reduction of energy used for processing the retort pouch versus the can did not influence the comparative cost analysis to any significant extent.

5443 Balanced urban ground-passenger transportation with respect to energy, demand, and income: an approach for bus-transit supply-system planning. Chang, M.S. Raleigh, NC; North Carolina State Univ. (1980). 220p. University Microfilms Order No. 81-11,382.

Thesis (Ph. D.).

Balanced urban ground-passenger transportation as the optimum mixture of transportation services between automobiles and buses is analyzed using a piecewise linear-programming model. In an effort to achieve balanced transportation, the study estimates how many person trips should be carried by automobiles and buses in an urban region under such constraints as energy, demand, and income. Social cost is postulated to accrue for each trip if the transportation-supply system is not in satisfactory condition. The magnitude of social cost is postulated to be different between trips generated by different income groups and modes. The objective function in this piecewise linear-programming model is the minimization of social cost. Use of a piecewise linear-programming technique to achieve balanced transportation in an urban region is an attempt to examine the adequacy of an urban ground-passenger transportation-supply system. Application of the model to a city will indicate the degree of imbalance between modal trips caused by lack of demand or supply. The model appears to be very promising for the determination of the cause and magnitude of current transit imbalance, the resources and services required for balance, transit-marketing policy, and Federal subsidy for transit.

5444 Common sense approach to conservation. Nath, K.R. pp 95-103 of Proceedings of second annual energy seminar. Erie, PA; Gannon University (1980).

From 2. annual energy seminar, Erie, PA, USA (31 Mar 1980).

An attempt is made to present a method to make a plant more efficient and improve profitability. The basic premise presented is that for every potential benefit there is a cost associated with

the benefit. Efforts concerning conservation discussed include capital expenditures, non-capital expenditures, and people. (MCW)

5445 Building to save energy: legal and regulatory approaches. Thompson, G.P. Cambridge, MA; Ballinger Publishing Company (1980). 278p.

This book examines the tools that government can employ to help citizens use less energy in the construction and operation of their buildings. It considers the vast array of energy-conservation actions that might be taken and selects from that array those actions that fit two criteria: (1) they must be worth doing in terms of the amount of energy saved, and (2) actions considered should be ones in which laws or regulations have the potential for being effective and efficient. The first chapter presents some of the statistics that are known about buildings and the energy they use in the USA. The second chapter deals with the institutions (both public and private) that regulate building design and construction. The next several chapters look at the components of the building, examining the development of legal controls for insulation, air seepage, and ventilation; equipment used to heat and cool the building; and lighting. Finally, the broader question of legal controls to change the way buildings are designed and look are considered.

2902 Supply, Demand, And Forecasting

REFER ALSO TO CITATION(S) 5322, 5380, 5389, 5473, 5474, 5478, 5489, 5502, 5512, 5529, 5532, 5537, 5540, 5556, 5567

5446 (AD-A-091569) Army energy plan. (Deputy Chief of Staff for Logistics (Army), Washington, DC (USA)). 8 Aug 1980. 189p. NTIS, PC A09/MF A01.

The Army Energy Plan describes the current and projected (to the year 2000) energy situation in which the Department of the Army (DA) must operate and summarizes those actions and programs which have been developed and/or are needed to cope with those conditions. It addresses the Army goals, objectives, policies, and programs for all Army activities. World industrial growth during the past century has been characterized and hastened by the widespread availability of inexpensive energy, primarily petroleum. The Arab oil embargo of 1973 served to drive home a number of points, key among them being that the world's principal oil consumers are not the major oil producers. The Middle East and Africa have an estimated 67 percent of the petroleum reserves while Western Europe and the Western Hemisphere have only 16 percent. By most estimates, these reserves are expected to be exhausted within the next 70 years. In the year following the 1973 oil embargo, prices for petroleum rose threefold, signaling the end of the cheap oil. In the decade of the seventies, the price of imported crude oil has risen from \$1.80 per barrel to an exorbitant \$30.00 per barrel. The combined threats of exhaustion and high cost mandate the use of alternate sources of energy. The distribution of alternate sources of recoverable oil, such as tar sands and oil shale, favor the Western Hemisphere, but economical recovery techniques have not been developed.

5447 (ANL/CNSV-TM-70) Guidebook for analysis of state-level economic impacts of an energy shortfall. Gunnison, F. (Argonne National Lab., IL (USA)). Jun 1981. Contract W-31-109-ENG-38. 177p. NTIS, PC A09/MF A01. Order Number DE81027033.

This guidebook is designed to assist state policymakers in estimating the economic impacts of an energy supply shortfall. The guidebook does not contain state specific information, but outlines general procedures that can be tailored to specific state needs. Chapter 1 provides a user's guide to the book as well as cautions concerning its use and potential accuracy. The second chapter describes one general procedure for analyzing the possible economic impacts of an energy supply shortfall. The third chapter provides specific guidelines for constructing a simple model or first-order approximation of some of the immediate economic impacts of an energy supply shortfall. Chapter 4 examines several different petroleum supply shortfall scenarios comparing a base case with a 7% shortfall and a 14% shortfall. Then the analysis compares a shortfall affecting all sectors of the economy with one affecting private transportation alone. Thirdly, the chapter studies a shortfall affecting one state more severely than the rest of the nation. Each of

those scenarios considers first-year and longer-term impacts. Finally, Chapter 4 analyzes the impact of restricting natural gas hookups for residential customers. The appendices provide further information on data sources, a survey of state-level models, and a detailed description of the state-level econometric model.

5448 (DOE/CS/50189—T1) Energy-economy study methods and transit cases. Final report. Henderson, C.; Ellis, H.T. (SRI International, Menlo Park, CA (USA)). Jul 1981. Contract AC03-80CS50189. 89p. NTIS, PC A05/MF A01. Order Number DE81027485.

The purpose of this report is to describe energy economy study methods that are now available for practical use. The report discusses methods of estimating energy demands in Chapter II. Three heavy rail transit systems and bus systems (Chapters III to VII) are described in terms of their development history, physical characteristics, operations, service, and energy demands. Estimates are made for the direct and indirect energy demands for the systems and energy economy studies of hypothetical alternatives for operations, equipment, or facilities are presented for the following systems: PATH (Port Authority Trans-Hudson) rail system; BART (Bay Area Rapid Transit District) rail system; AC Transit (Alameda-Contra Costa Transit District) bus system; Washington Metropolitan Area Transit Authority (WMATA) Metrobus and Metrolink systems. Chapter VIII discusses a number of opportunities to conduct energy economy studies, and presents quantitative data for three comparisons of hypothetical alternatives. Some information from actual settings was used. (MCW)

5449 General problems of the world fuel-energy situation (on the basis of the 11th World Energy Conference). Beschinski, A.A. *Teplotoenergetika (Moscow)*; No. 2, 3-8 (Feb 1981). (In Russian).

According to the latest evaluations world energy resources amount to 13,092 billion t of coal equivalent, of it coal constitutes 83% and hydrocarbons 16%. It is stated that 40% of solid fuel resources is located in the USA, 30% in USSR, 15% in Asia and 5% in Europe. World energy balance, energy demand and supply, energy mix, and forecast energy mix in the year 2000, are discussed. It is noted that according to the 10th World Energy Conference energy demand will increase to 25 billion t of coal equivalent in the year 2000 and to 34 billion t in year 2020. According to the forecasts presented during the 11th World Energy Conference, in the year 2000 energy demand will range from 15 to 22 billion t of coal equivalent. The forecast yearly growth rate of energy demand is 3.2%. Forecast increase of coal output, investment and production cost are evaluated. Role played by oil and nuclear energy is also discussed. Problem of energy conservation is stressed. It is stated that up to 2000 30% of energy demand could be covered by energy conservation. Of the 30% about 10% can be economized by organizational measures without major cost, 10% by organizational and technological measures which can bring results within 2 to 4 years, and further 10% by investment with long payback period. It is suggested that world energy forecasts during the 11th Conference were artificially dramatized. (10 refs.) (In Russian)

5450 World Energy: the facts and the future. Hedley, D. New York, NY: Facts on File, Inc. (1981). 368p. \$22.50.

Maintaining the world's energy supply is the most pressing problem, threatening progress and the standards of living of rich and poor countries alike. This book examines how energy is used in the world and how much energy is used; where the fuel resources are, how long they will last, which countries have the fuel, and which countries need it the most; the implications of the energy crisis for transport; the development of synthetics; the impact of conservation; and the renewable energy sources and what progress is being made with them. Forecasts show how the world energy economy will have changed by the year 2000, and what is likely to happen beyond that. Energy planning and decisions will affect us internationally, nationally, commercially, and personally. 49 references, 32 figures, 154 tables.

5451 (SERI/CP—633-1145, pp 131-137) Review of industrial energy use. Hamel, B.B.; Brown, H.L. (General Energy Associates, Inc., Philadelphia, PA). Apr 1981. NTIS, PC A08/MF A01.

In Solar thermal energy systems research and advanced development program review.

Three principal areas are addressed: the basic approach used to construct General Energy Associates (GEA) industrial data system; some general observations about energy use in the industrial sector at the national level; and some specific examples of the rather specific definition of industrial process heat requirements for a given industry and geographic region, such as petroleum refineries in the Southwest. The work of GEA in developing large industrial data systems is briefly reviewed and results on national and regional use are described.

5452 Energy in a finite world: executive summary. McDonald, A. Laxenburg, Austria; International Institute for Applied Systems Analysis (1981). 68p.

Report by the Energy Systems Program Group of the International Institute for Applied Systems Analysis; Wolf Haeefe, Program Leader.

This report summarizes the results of a seven-year study conducted at IIASA in Laxenburg, Austria. The work, which involved over 140 scientists from 20 countries, aimed to provide new and critical insights into the international long-term dimensions of the energy problem. Given this objective, the 50-year period from 1980 to 2030 was analyzed in detail, though parts of the study looked even further into the future. Geographically, all countries of the world were included - developed and developing, market and centrally planned economies. The results are described in *Energy in a Finite World: Paths to a Sustainable Future* published in 1981 by the Ballinger Publishing Company, Cambridge, Massachusetts, USA; more detail is provided in a second volume also from Ballinger - *Energy in a Finite World: A Global Systems Analysis*. The picture that emerges is one of a world facing, during the 1980 to 2030 period, what is anticipated to be the steepest ever increase in its population. Despite the resultant strains on the world's physical resources, institutions, etc., it is concluded that the potential exists to provide the energy for a world in 2030 that is more prosperous than the world of today while supporting a population double that of 1975.

5453 Alternative energy technologies: blueprint for the future. Fernandes, J.H. *Progress*; No. 1, 16-18 (1981).

Confident that there is no energy crisis if domestic energy sources are developed, the author explains in this interview how many of the world's economic strains could have been avoided if the US were more self-sufficient in fuel. The energy situation is a chronic shortage of hydrocarbon fuels, but policies to stimulate alternative fuels and energy conservation can correct this. The prospects for increased domestic coal, oil, and gas production are reviewed for both conventional and unconventional means. The US must pursue its best near-term alternative options, which include nuclear power, enhanced oil recovery, the development of tar sands and oil shale, and some solar. 3 figures. (DCK)

5454 Energy in a finite world: a global systems analysis. Haeefe, W. Cambridge, MA; Ballinger Publishing Company (1981). 837p.

Report by the Energy Systems Program Group of the International Institute for Applied Systems Analysis.

This study, which began in the summer of 1973, focused for the first two years on understanding and conceptualizing the energy problem. This led to the design of a set of energy models that were subsequently used for developing two scenarios - the principal tool of the quantitative analysis. This book, which was completed in December 1979, reflects work up to this date. The purpose of this book is not to advance the state of the art of a particular discipline, but to look at each of the different aspects of the energy problem in a new way - to view them as an integral part of an overall pattern. The book is divided into 6 parts and a total of 25 chapters. Part I, Introduction, states the problem. Part II, Energy Supply, contains a total of 6 chapters, namely: Fossil-Energy Resources; The Coal Option; The Nuclear Option; The Solar Option; Renewable Energy Sources; and A Review of Energy-System Considerations. Part III, Constraints, contains chapters entitled: Market Penetration; The WELMM Approach to Energy and Natural Resources; Energy and Climate; Risks and Standards in Energy Systems; and Constraints on Energy Supply: The Summary. In Part IV, Balancing Supply and Demand, chap-

ters included are: The Analytical Approach; Two Scenarios Defined; Interpretation of Scenario Projections; Energy Consumption and Conservation; Energy Supply and Conversion; Alternatives and Sensitivities; Economic Impacts; and Summary. In Part V, Perspectives, the chapters are: Energy, Negentropy, and Endowments; New Old Technologies; Energy Densities, Land Use, and Settlement Patterns; and The Hard-Soft Controversy. Part VI, Assessments and Implications, has only one chapter, The Problem Revisited, and was written by the Program Leader, Dr. Wolf Haefele.

5455 Temporal cross-section specification of the demand for gasoline using a random-coefficient regression model. Kraft, J., Rodekohr, M. (National Science Foundation, Washington, DC). *Energy (Oxford)* ; 5: No. 12, 1193-1202 (Dec 1980).

This paper uses a random-coefficient regression approach to estimate the demand for gasoline by pooling cross-sectional (state level) and time-series data. The analysis proceeds by estimating two alternative models, namely a stock-adjustment model and a flow-adjustment model. The two models are estimated using state-level data on gasoline consumption, gasoline price, income, and the stock of automobiles. The random-coefficient specification of each demand model is estimated assuming heteroskedastic disturbances across states, autocorrelated disturbances over time, and variable-intercept and slope coefficients across states. The resultant price and income elasticities are compared and inferences concerning the ability of the flow adjustment model to approximate the underlying demand function are made. 20 refs.

5456 Fuel choice and aggregate energy demand in the residential and commercial sectors. Cohn, S.M. (Oak Ridge National Lab., Tenn). *Energy (Oxford)* ; 5: No. 12, 1203-1212 (Dec 1980).

The energy demand response of the residential and commercial sectors to fuel price changes is of increasing importance to public policy makers. In this paper, the demands for energy in both sectors are examined separately using a refined data base. For each sector, a multinomial logit formulation is utilized, along with an aggregate demand equation to determine analytically short- and long-run fuel-price elasticities of demand for the major fuels consumed. It is found that increases in energy prices have a greater effect on energy demand in the commercial sector. Furthermore, in both sectors, raising electricity prices has a greater effect for conserving energy (both end-use and primary) than do equal price rises for natural gas or heating oils. 18 refs.

2930 Policy, Legislation, And Regulation

REFER ALSO TO CITATION(S) 5326, 5344, 5345, 5376, 5408, 5434, 5438, 5445, 5511, 5528, 5529, 5531, 5542, 5552, 5558, 5600, 5622

5457 Models for national energy policy analysis and planning. Kavrakoglu, I. (Bogazici Univ., Turkey). *Automatica* ; 16: 379-392 (1980).

Two mathematical programming models were developed and used to evaluate energy policy options available to the Turkish government. One of these uses linear-programming techniques to analyze major conversions and investments during a 15-yr period related to solid fuels, liquid fuels, and electricity. The other uses mixed-integer programming techniques to analyze activities in the energy sector in considerable detail for a time span of 24-yr. The models were validated using test data. Experiences with implementation of the models are described. Their primary contribution with respect to energy decision-making is in providing a comprehensive framework upon which specific analyses can be based. 8 references, 5 diagrams, 11 graphs, 5 tables.

5458 Politics and administration in Mexico: recruitment and promotion of the politico-administrative class. Kelley, G. Austin, TX; University of Texas (1981). 18p. (NP-1903985).

Issues are discussed which shape the context of policy in Mexico. The paper is divided into two parts. The first deals with possible ways in which recruitment and promotion practices infringe on such intervening variables as coordination, innovation, in-

formation flows, participation, and responsiveness, variables which, in turn, condition the nature and quality of the final dependent variables: the policy decision itself and its implementation, or the chain of progressively lower-level decisions. The second part attempts to contribute to the clarification of the role of the technico in Mexican politics, and some tentative suggestions are advanced as to underlying changes in the political and policy process. (GHT)

5459 (PB-81-116501) Analytical studies for the U.S. Environmental Protection Agency. Volume VI. Implications of environmental regulations for energy production and consumption. (National Research Council, Washington, DC (USA)). Aug 1977. Contract EPA-68-01-2430. 250p. NTIS PC MF A01.

This report evaluates the energy, economic, and environmental implications of selected controversial federal environmental regulations—offshore oil and gas production; automobile emissions; thermal water pollution; sulfur dioxide emissions from electric power plants; as low as practicable radioactive emissions; surface coal mining and the National Environmental Policy Act; and prevention of significant deterioration of air quality.

5460 (PB-81-118028) New York State energy master plan and long-range electric and gas report. Volume 1. Executive summary. Final report. (New York Energy Office, Albany (USA)). Mar 1980. 41p. NTIS, PC A03/MF A01.

Partial listing of topic areas include: Scope and impact of planning process; Structure of master plan; State energy policies; Current and forecast energy requirements; Reshaping the state's energy future; Schedule for planning process.

5461 (PB-81-118036) New York State energy master plan and long-range electric and gas report. Volume 2. Appendices. Final report. (New York Energy Office, Albany (USA)). Mar 1980. 165p. NTIS, PC A08/MF A01.

A partial listing of contents includes: Summary of the plans of major energy suppliers; Forecast of New York state energy requirements; Economic impact analysis.

5462 (PB-81-118044) New York State energy master plan and long-range electric and gas report. Volume 3. Final report. (New York Energy Office, Albany (USA)). Mar 1980. 219p. NTIS, PC A10/MF A01.

A partial listing of contents includes: Policy context; New York state energy-use energy requirements, base case; Plan elements—overview; Conservation; Research and development plan; Energy financing—Institutional changes; Impact of rising energy costs on low income households; Long-range electric and gas report.

5463 (PB-81-121949) Report impact analysis for the proposed heavy-duty diesel particulate regulation. Technical report. Heiser, D. (Environmental Protection Agency, Ann Arbor, MI (USA)). Aug 1980. 8p. NTIS, PC A02/MF A01.

EPA is preparing to propose a particulate emission standard for 1985 and later model year heavy-duty diesel vehicles. Under Executive Order 12044, Improving Government Regulations, government agencies must report new reporting burdens or record keeping requirements before new significant regulations are adopted. EPA requires a 'report impact analysis' to comply with executive Order 12044. This analysis has been performed in fulfillment of this requirement. This report will examine the information already required and determine the additional information that will have to be submitted. Also to be addressed are the reasons for requesting this additional information.

5464 US energy self-reliance will ensure national security. Hart, G. *Energy User News* ; 6: No. 30, 30-31 (27 Jul 1981).

Energy self-reliance should be made a major element in national-security planning because the military can no longer guarantee Persian Gulf oil delivery at a time when our dependence on Middle East oil continues to grow. The money spent on OPEC oil reduces the capital needed to revitalize the US economy and limits US options. A major supply disruption under current policies will make military intervention inevitable even though it will be coun-

terproductive. A three-step plan to halve imports by 1990, supplemented with immediate steps to complete filling the Strategic Petroleum Reserve, proposes to (1) place a tariff on imports that would reduce demand and raise revenue to fill the Reserve; (2) balance energy resources and energy consumption with an energy budget that uses economic incentives to increase domestic production, lower demand, and encourage alternative energy technologies; and (3) agree on government's role. The Reagan Administration's decision to reverse government support of new technologies ignores the security cost of relying exclusively on market forces. (DCK)

5465 On energy policy, the administration prefers to duck, defer, and deliberate. Corrigan, R. *National Journal*; 13: No. 29, 1280-1283 (18 Jul 1981).

Faith in the free market rather than federal action is President Reagan's solution to the energy situation. The emphasis on undoing regulations has not been balanced by positive actions yet, but there are indications of activity on the following pending issues: oil shortages, the Strategic Petroleum Reserve, Alaska pipeline, gas deregulation, synthetic-fuels subsidies, nuclear expansion, and coal exports. The market-oriented approach is a radical shift from the crisis orientation of the past three presidents as is the opening of federal lands to energy development. Current policymakers see no need for forecasting since the market should determine future energy mixes and supplies. Energy could be ignored in favor of economic concerns because of a worldwide oil surplus, which critics warn is only temporary. (DCK)

5466 Purpa primer. Lornell, R. (Solar Energy Research Inst., Golden, CO). *Solar Law Reporter*; 3: No. 1, 30-65 (May 1981).

Section 210 of the Public Utility Regulatory Policies Act of 1978 (PURPA) encourages decentralized power production from renewable energy sources and cogeneration. It requires that electric utilities buy power from qualifying generating facilities at the utility's avoided cost and sell power to them at nondiscriminatory rates. It also exempts the facilities from most federal and state regulation. Entities with responsibilities under FERC's regulations implementing PURPA include state utility commissions, electric utilities, and qualifying facilities.

5467 Case studies in state solar legislation. Craft, R.; Anthony, S.; Bailey, J.; Marchand, J.P. *Solar Law Reporter*; 3: No. 1, 67-84 (May 1981).

Solar legislation often takes a tortuous path through state legislatures, the more so because solar energy is a relatively new area for state legislation. These three case studies, from Georgia, Maine, and South Carolina, have lessons for solar advocates in preparation for the session, understanding the workings of the legislature, and following up on legislation once it is enacted.

5468 State legislation: abstracts. *Solar Law Reporter*; 3: No. 1, 110-169 (May 1981).

The bill number, sponsor, status, and an abstract is listed for current solar related legislation in each state. A topical index is included. (LEW)

5469 Tribal severance taxes: outside the purview of the commerce clause. Tixier, S. *Natural Resources Journal*; 21: No. 2, 405-413 (Apr 1981).

The issues surrounding severance taxes as a way to conserve nonrenewable resources and to compensate taxing entities for the depletion of their resources are illustrated in the case of Merriion vs Jicarilla Apache Tribe. The appeals court decision to uphold the sovereign power of an Indian tribe to tax resource extraction has been granted a Supreme Court review. A district court found a 30% tax to be discriminatory and a violation of the commerce clause, but the decision was reversed by the appeals court. At issue is the relationship of a dual tribal and state power to tax. A decision that the tax is unconstitutional will mean that any taxing entity can impose up to 30% taxes on any event which precedes commerce. (DCK)

5470 Reaganites, with OMB's list in hand, take dead aim at EPA's regulations. Mosher, L. *National Journal*; 13: No. 7, 256-259 (14 Feb 1981).

Regulations being studied for repeal or drastic modification are listed. They deal mainly with transportation, electric power, and nuclear power industry mainly in environmental areas but a few deal with toxic substances in the health areas. (PSB)

5471 Energy forecast: partial clearing. *Nation's Business*; 69: No. 2, 32-34, 36, 38 (Feb 1981).

The pros and cons of deregulation are discussed with resultant impacts on inflation and energy supplies, especially oil and natural gas. Government policies on synthetic fuels are also considered. Pollution control effects are also considered. (PSB)

5472 Energy: why planners must be involved. Owens, S.E. (Univ. of Nottingham, Engl). *International Journal of Environmental Studies*; 16: No. 3-4, 197-206 (1981).

It seems probable that planners will increasingly be involved with all aspects of the energy system. This paper attempts to outline some of the fundamental issues with which they will be concerned. It considers, first, the physical and socio-economic impacts of energy-supply facilities and then discusses the ability of the planning system to respond to energy-development pressures. It then turns to the less-tangible problems of energy efficiency in the built environment and considers the potential for improvement together with some of the many constraints involved. 33 refs.

5473 National energy profiles. Stunkel, K.R. (ed.). New York, NY: Praeger Publishers (1981). 425p.

This volume is concerned with the role, fitness, and prospect of nations as managers and policymakers in the domain of world energy sources. Eight countries are considered, falling roughly into two groups: (1) developed - the United States, the Soviet Union, and Japan; and (2) developing - China, Brazil, Mexico, Nigeria, and Taiwan. The editor notes that: The spirit of this book is frankly normative and policy oriented; and the empirical analysis of the usual social science studies is mingled with a deliberate consideration of useful and meaningful goals, with self-conscious acceptance of the premise that certain preferred values ought to govern any rational, sensible energy policy. A separate abstract was prepared for each of the nine chapters.

5474 Introduction: energy and the future of nations. Stunkel, K.R. (Monmouth Coll., West Long Branch, NJ). pp 1-36 of National energy profiles. Stunkel, K.R. (ed.). New York, NY: Praeger Publishers (1981).

An historical and global view of energy can be gained by examining its causal relationships to the concepts of nationalism and a growing world population, thermodynamic entropy, biological evolution, and spaceship earth. Man has only recently begun to recognize the patterns and consequences of global energy requirements and use as self-sufficiency gives way to social interdependence. Resource depletion threatens a short life for an industrialized society, which consumes faster than it can provide substitutes and whose institutions have failed two-thirds of the world's population. A rational energy policy would strike a balance between overly optimistic and doomsday visions by recognizing and assigning a true value to resources and the limitations and costs of technological solutions. The wide disparity between global economic progress and the magnitude of global poverty as well as the growing awareness among the poor of this disparity underscores the need for appropriate energy development to meet basic needs. A social order based on equity and environmental responsibility is basic to a world energy policy capable of addressing these problems. The eight chapters of this book examine the national profiles of the US, Soviet Union, Japan, People's Republic of China, Brazil, Mexico, Nigeria, and Taiwan. 79 references. (DCK)

5475 United States. Rosen, D.J. (Rutgers Univ., New Brunswick, NJ). pp 39-81 of National energy profiles. Stunkel, K.R. (ed.). New York, NY: Praeger Publishers (1981).

The energy component of US development and a consuming life style during a period of secure and inexpensive energy supplies has made the US the highest per capita consumer in the world, straining both the environment and international relationships. The energy mix has changed with technological innovation along with the rate of consumption, a shift to centralized energy generation, and shifts from energy use for basic home needs to the production

and marketing of goods and the transportation of both goods and people. The American people perceived in the early 1970's that this growth was not improving the quality of life, and they began demanding domestic energy policies to deal with the impacts of energy use. The government's response is traced in the development of energy sources and found to be lacking in either planning or boldness, especially in the need to reduce US dependence on Middle East oil. A review of the effort to develop a comprehensive National Energy Plan reveals the government's inability to cope with problems of nuclear safety, coal production, energy conservation, and a balance between energy supply and environmental quality. The US is now more aware of the international implications of energy policy and the need for cooperative planning. Future policy decisions must choose between the hard and soft paths and accept the risks involved with each. 67 references, 3 tables. (DCK)

5476 Soviet Union. Kelley, D.R. (Univ. of Arkansas, Fayetteville). pp 82-119 of National energy profiles. Stunkel, K.R. (ed.). New York, NY; Praeger Publishers (1981).

Policies focused on rapid industrial growth, especially heavy and defense industries, and a shift from indigenous coal and lignite to oil and nuclear power characterize energy use in the Soviet Union. A breakdown of actual consumption patterns illustrates the poorly developed state of consumer production. Soviet policy has always keyed industrial growth to a strong domestic economy, but planners are becoming increasingly concerned that social and economic problems will slow continued growth. An increasing dependence on high technology from the West, lagging research, and manpower problems are already slowing the GNP growth rate. Projections for domestic energy development may be overly optimistic and may require lower expectations for development. Energy production and conservation opportunities are outlined even though accurate information is difficult to obtain. Energy exports give the USSR some short-run economic and political advantages. Environmental issues have been raised in the past decade, but the emphasis of the centralized government continues to give development top priority. Unlike other industrial nations, unlimited growth prospects continue to be an article of faith for Soviet leaders. Domestic energy shortfalls will probably be delayed and less severe, but the lack of a centralized environmental program may cause trouble in the short term. 47 references. (DCK)

5477 Japan. Stunkel, K.R. (Monmouth Coll., West Long Branch, NJ). pp 120-170 of National energy profiles. Stunkel, K.R. (ed.). New York, NY; Praeger Publishers (1981).

Ranking second in market and third in the world economy, Japan's energy use has been growing for 90 years. Imported oil dominates current consumption in a country that produces only 10% of its primary energy. Dependence on oil will continue longer than for other industrialized countries, but the use of domestic coal and hydropower will begin to increase. The intensity of post-war development make Japanese industry a leading contender for the most energy-intensive and pollution-prone. The physical and social systems are already overtaxed, but the problems and the need to shift to high technology are recognized. More growth in energy use is projected for the near future because the economy is geared to rapid growth and government planners appear to be indecisive. The high cost of oil has not affected consumption policies or promoted more than superficial conservation efforts other than some recycling projects which lack a national focus. Some interest in energy self-sufficiency is developing, but national policy is investing in more oil. Nuclear development policies are uncertain, as are fusion, solar, and geothermal energy. Japan's oil industry emphasizes refining crude oil from Mid-East suppliers and marketing petroleum products. China may become a new supplier of natural gas in return for liquefaction technology. All of Japan's suppliers involve complex international relations and competition. 111 references, 5 tables. (DCK)

5478 People's Republic of China. Kim, S.S. (Princeton Univ., NJ). pp 171-218 of National energy profiles. Stunkel, K.R. (ed.). New York, NY; Praeger Publishers (1981).

Chinese energy and economic policies reflect national values and the allocation of resources in a country that has only 7% of the world's arable land to feed 20% of its people. Energy development

in China reflects its path toward modernization and provides a framework for other developing countries to study. Subsistence agriculture based on animal and human muscle power sustained the Chinese economy for millennia until foreign imperialism and later the establishment of the People's Republic of China (PRC) brought changes to energy development. While rural China continues in a solar-dominated ecosystem, commercial and industrial activities rely increasingly on coal, oil, natural gas, and hydroelectric power. Energy policy has been unpredictable, changing frequently because of political and environmental pressures, and resulting in economic development that is both uneven and impressive. Policy changes in the post-Mao era emphasize modernization and a shift in priority from political to economic considerations. A review of world energy and economic impacts and Chinese responses covers domestic energy development and international policy as the PRC transferred itself from a dependent consumer to a self-sufficient exporter. A systems approach to environmental protection has so far avoided many of the pollution problems and may continue to do so despite policies that recognize the supply-and-demand linkage of energy and modernization. 119 references, 3 tables. (DCK)

5479 Brazil. Erickson, K.P. (City Univ. of New York, NY). pp 219-269 of National energy profiles. Stunkel, K.R. (ed.). New York, NY; Praeger Publishers (1981).

The oil crisis of the 1970's created special problems for Brazil, which was emerging from a Third World status into a period of optimistic development. Brazil's growth policies, however, were based on imported oil. To continue this development, the country must sustain a high growth rate at the same time it becomes more energy-efficient. Energy-use changes from wood to oil took only one generation, with wood, oil, and hydropower now supplying 85% of the nation's energy. A review of energy policies suggests that the adoption of the US as a model was unfortunate because most of the development surge has been in energy-intensive sectors. An unusual decline in the ratio of energy consumption to gross national product is likely a one-time rise in apparent efficiency that can accompany the shift to modern equipment. Brazil must increase domestic energy development, increase nonenergy exports, or decrease energy consumption in order to continue its economic development. The policies and practices that Brazil's planners must design and implement to pursue these goals are discussed, but no way is seen to make the country self-sufficient in energy production in the foreseeable future. A bid for world power status will rest on the success of Brazil's energy policies. The environmental impacts associated with extensive energy development are intensified by a lack of responsible effort even though the technology to minimize pollution is available. The country suffers from a small environmental movement and a loose energy policy. 127 references, 3 tables. (DCK)

5480 Mexico. Randall, L.R.R. (City Univ. of New York, NY). pp 270-314 of National energy profiles. Stunkel, K.R. (ed.). New York, NY; Praeger Publishers (1981).

Limited water power and poor-quality coal have made Mexico increasingly dependent on petroleum, nuclear, and nontraditional energy sources in the 20th century. Private development of energy production declined in the 1930's as government control, notably through Pemex, took over. Government control has affected the use as well as the supply of energy in Mexico's effort to achieve economic development based on energy exports. Mexicans are convinced that the US will request more of its oil than they wish to sell, which underscores the importance of correlating energy development with economic and foreign policy. The country has not developed strong, effective environmental or energy-saving regulations. Giant oil discoveries are the basis for Mexico's faith in the future, with oil development a cornerstone of development plans. A review of Mexico's energy and economic plans covers all energy sources and their assigned priority. As a net exporter, Mexico is neither a member of OPEC nor willing to form bilateral producer agreements, although it is interested in foreign investment and the transfer of technology. 130 references, 4 tables. (DCK)

5481 Nigeria. Wilson, E.J. III. (Resources for the Future, Washington, DC). pp 315-358 of National energy profiles. Stunkel, K.R. (ed.). New York, NY; Praeger Publishers (1981).

Nigeria is an industrializing country which is also the world's seventh largest oil exporter and eager to use oil prices to finance its own development. Since the demand for domestic energy is greatest at the beginning of economic development, Nigeria has also been importing petroleum products. A large noncommercial sector relying on wood and animal wastes and a decentralized political system which is converting from military to civilian rule, Nigeria offers a unique profile. As the country emerges from the effects of colonial rule and shifts its energy policy from one of production to that of distributing goods and services, politics continues to be an important factor. The 1980's will be a period for building an infrastructure to promote balanced energy production and economic growth. A review of Nigeria's energy supplies and development plans in this context concludes that regional and ethnic disparities will continue to affect international as well as domestic policies until they are reconciled. Environmental considerations have not yet emerged as political issues, although pollution problems exist. Nigeria's future will depend on its success in developing an infrastructure able to implement its policies. 82 references, 11 tables. (DCK)

5482 Taiwan. Copper, J.F. (Southwestern Univ., Memphis, TN), pp 359-388 of *National energy profiles*. Stunkel, K.R. (ed.). New York, NY: Praeger Publishers (1981).

Taiwan's fast-growing economy requires a heavy dependence on energy imports, even though the island was once considered ideal for energy self-sufficiency. Coal, petroleum, and natural gas were adequate until the 1950's, when rapid development exceeded energy capacity because of an energy-intensive industrial expansion, a rising per capita income, and a rapid growth in population. Domestic energy policies seeking to develop all fossil and renewable energy sources have not kept up, however, causing new international strains in the world market. Nuclear development was undertaken in the late 1960's as a low-cost alternative to Middle East oil and to mitigate serious pollution problems. Rapid urbanization has progressed faster than environmental policies, and development policies will likely continue to subordinate environmental issues unless the pollution interferes with international regulations. Future development may ultimately depend on Taiwan's finding cheaper and cleaner energy sources and using them more efficiently. 110 references. (DCK)

5483 Solar energy and the law. Dean, N.L. (Environmental Law Inst., Washington, DC); Hayes, G.B.; Meeker, F.O.; Miller, A.S.; Thompson, G.P. pp 26.1-26.25 of *Solar energy handbook*. Kreider, J.E.; Kreith, F. (eds.). New York, NY: McGraw-Hill, Inc. (1981).

Present laws are examined to see if they will thwart the future growth of solar usage in the US. Topics covered include solar access and land use, building codes, the role of utilities, and special difficulties involved with financing solar homes, problems with laws meant to exempt solar equipment from property taxation, and the possible financial hardship involved if solar systems were made mandatory on new structures. 175 references. (LEW)

5484 Congress and national energy policy: assessing the policymaking process. Kraft, M.E. (Univ. of Wisconsin, Green Bay), pp 37-59 of *Environment, energy, public policy: toward a rational future*. Axelrod, R.S. (ed.). Lexington, MA: D.C. Heath and Company (1981).

From Conference on energy and environment; Garden City, NY, USA (8 Jun 1979).

On July 15, 1979, President Jimmy Carter took his case for a rational energy policy to the American public. During 1977 and 1978, the US Congress deliberated on President Carter's national energy plan. Although the plan was comprehensive and national, Congress rejected its key elements. This chapter surveys the policymaking process in Congress and the various possible reasons for the failure of the plan. Although an optimistic attitude for the development of public support for a national energy future in US may be justified, perhaps a position of hopeful pessimism may be adopted. 46 references. (DLC)

5485 Role of local government in energy policy. Harrison, D. Jr.; Shapiro, M.H. (Harvard Univ., Cambridge, MA), pp 131-152 of *Environment, energy, public policy: toward a rational future*. Axelrod, R.S. (ed.). Lexington, MA: D.C. Heath and Company (1981).

From Conference on energy and environment; Garden City, NY, USA (8 Jun 1979).

Local governments may play a role in energy conservation by reducing energy consumption in operating public buildings and by encouraging private citizens to reduce energy consumption. Such a role is generally small, although local circumstances affect the effectiveness of federal and state programs. 27 references, 3 figures, 5 tables. (DLC)

5486 Access rights for the solar user: in search of the best statutory approach. Tiedeken, R. *Land and Water Law Review*; 16: No. 2, 501-523(1981).

The author reviewed the statutory efforts to develop legal rights of access for the solar user through express easements, zoning and planning, public nuisance laws and prior appropriation ideas. However, he sees the need for States to further encourage solar power usage through more comprehensive statutes. (PSB)

5487 Models as a help in energy policy decisions. Jansen, P. *O.Z.E., Oesterreichische Zeitschrift fuer Elektrizitätswirtschaft*; 33: No. 12, 438-451(Dec 1980). (In German).

The relationship between demand for energy and economic growth - in the past, these quantities have usually shown the same growth rates - is likely to change as a result of structural changes in the economy, saturation in the field of comfort, a more economical utilization of energy, and novel energy-conversion technologies. The article discusses the development of a model that can be used as a help in energy-policy decisions, with account being taken of various energy scenarios, nuclear energy policies, and ecological aspects.

5488 Energy policy: DOs and DON'Ts for the 1980s. Landsberg, H.H. (Resources for the Future, Inc., Washington, DC). *Electric Perspectives*; 15:21(Fal 1980).

The short term often seems more of a threat than the long term because possible oil-supply disruptions appear worse than the long-term economic adjustments. US energy use became 10% more efficient during the 1970s, and the number of Btus consumed per dollar of gross national product is declining as conservation becomes respectable. Better energy use requires that people have technical and economic information, some regulation when market forces are too slow, and conservation subsidies to offset energy-source subsidies. Price decontrol must continue until prices reflect true energy costs even though it increases inflation. Assistance can then be targeted to those who really need it. The housekeeping stage of energy conservation is now giving way to a more-difficult period of changing processes and abandoning obsolete facilities and equipment. Other dos and don'ts are outlined for gasoline, housing, liquid fuels, and nuclear policies that are based on using market forces to provide incentives for both energy development and efficiency. (DCK)

5489 Japan's unique energy situation. Sueda, M. (Committee for Energy Policy Promotion of Japan, Tokyo). *Electric Perspectives*; 23:30(Fal 1980).

Japan's success in weathering the oil-supply and price disruptions of the 1970s and still maintain a real growth rate should not obscure the fact that energy issues are still pressing. Japan is addressing its dependency on imports for 88% of its energy needs and the associated political vulnerability by participating in coal-liquefaction projects at both the national and the corporate level. A solar energy program is stimulating a boom in solar equipment, and government studies indicate a significant potential for geothermal energy. Efforts to diversify Japan's energy mix will depend on her success in technological innovation and organizational restructuring. 4 references. (DCK)

5490 Acid rain fallout threatens subsidies for utilities that convert to coal. Mosher, L. *National Journal*; 12: No. 18, 716-720(3 May 1980).

Discussion is presented on acid rain potential in the US after electric utilities convert from burning oil to coal. Data is presented on sulfur dioxide and nitrogen oxides emitted by utilities, industry, and transportation and the comparative costs of coal versus oil from 1973 through November 1979. Questions are raised on the wisdom of federal grants for encouraging the utility conversions. (PSB)

5491 Forecast for the refining industry: a 100% chance of political chaos. Samuelson, R.J. *National Journal*; 12, No. 15, 597-599 (12 Apr 1980).

The extent of the national government's role in regulating petroleum refineries after the present allocations regulations expire in September 1981 is discussed. There appears to be too many refiners for the projected drop in demand by 1985. Deregulation of price controls would allow import of refined products from Cuba, thus hurting Texas and Louisiana refiners. As a practical matter the author sees some allocation control necessary to forestall an embargo or unexpected supply interruption from causing bankruptcy for the small refiner. (PSB)

5492 Measuring technological bias. Stevenson, R. (Univ. of Wisconsin, Madison). *American Economic Review*; 70, No. 1, 162-173 (Mar 1980).

In this paper, a model based on the translog cost function and designed to test for technological advancement, factor-input and scale biases arising from technological advancement, and induced technological bias is described. The model is estimated with data from the electrical utility generation industry. While the empirical results for that industry demonstrate the existence of technological advancement and technological bias, both with regard to factor inputs and scale economies, the results failed to demonstrate the existence of induced technological bias. The results of this study indicate an average annual rate of technological advancement of approximately 1.5 percent while the average observed rate is 1.7 percent.

2940 Fossil Fuels

REFER ALSO TO CITATION(S) 5275, 5279, 5284, 5287, 5291, 5291, 5302, 5302, 5323, 5348, 5410, 5427, 5453, 5490, 5491, 5609

5493 (BNL—29773) Coal-oil mixtures: an alternative fuel for the commercial markets and large residential markets. Butcher, T.A.; Isler, R.J. (Brookhaven National Lab., Upton, NY (USA)). 1981. Contract AC02-76CH00016. 29p. (CONF-810674—2). NTIS, PC A03/MF A01. Order Number DE81028335.

From 1981 international conference on residential solid fuels; Portland, OR, USA (1 Jun 1981).

Results are presented of Phase 1 of a program aimed at promoting wide-spread use of coal-oil mixtures in large residential and commercial sector size oil-fired heating equipment. Fuel properties are discussed including viscosity, heating values, and effect of coal particle size. On-site mixing of COM is not considered practical for users in this size range and a number of central preparation plant projects are in progress. Options for on-site storage including the addition of paddle agitators, recirculation agitation systems, auxiliary tanks, and stable slurries are discussed. Fuel pump, controls, and atomizer modifications will be required as well. The coal as may present special problems and sootblowers, cyclones, baghouses, and scrubbers are considered.

5494 (BNL—51208) Long-range assessment of R & D policy for gas-related conversion technologies and unconventional natural gas resources. Kydes, A.S.; Rabinowitz, J. (Brookhaven National Lab., Upton, NY (USA)). 25 Apr 1980. Contract AC02-76CH00016. 134p. NTIS, PC A07/MF A01. Order Number DE81030143.

This study analyzes the energy impacts on the US energy-economy system on a set of successful R & D programs. These programs are presumed to have led to the commercialization of innovative technologies that increase the US gaseous fuels resource base and promote the development of advanced natural gas conversion technologies for residential/commercial uses. The GRI and its principal subcontractor, TRW Incorporated, provided the detailed

specifications of the energy conditions for both a Base Case and an R & D Policy Case. These conditions can be broadly categorized in terms of key energy resource price assumptions, energy resource availabilities, technology characterizations and market penetration guidelines for all energy technologies. Dale W. Jorgenson Associates (DJA) developed a set of demographic and economic projections including population, employment, and real GNP growth rates. The GRI and TRW staff provided the technology characterizations for most of the gas-related technologies and a number of other technologies. The data for the remaining technology characterizations were taken, for the most part, from Bhagat et al. This report presents the energy results from the BNL/DJA energy-economy system as executed under GRI specifications. It is intended to serve as a complement to the DJA report on the macro-economic consequences of these specifications. Certain assumptions incorporated in the R & D and Base scenarios relating to market penetration were identified as particularly sensitive. In light of the uncertainty inherent in them, an additional set of sensitivity runs were requested by GRI and are presented in Appendix B.

5495 (BNL—51314) Situation report for petroleum exporting countries. Hermelee, A.; D'Acerno, J.; Beller, M.; Smith, T.A. (Brookhaven National Lab., Upton, NY (USA)). Nov 1980. Contract AC02-76CH00016. 180p. NTIS, PC A09/MF A01. Order Number DE81030146.

This report incorporates the contents of fifteen individual situation reports for major petroleum exporting countries that were prepared from the Office of Energy Emergency Management Information System. The situation reports give a synopsis of political, economic, and petroleum industry data for each oil exporting country and are designed to provide up-to-date information enabling the EEMIS Project Office to react in a timely manner to late-breaking events. The report gives a brief overview of crude oil production for the major oil producing regions of the world and identifies crude flows from the major oil producing to consuming regions - Western Europe, United States, and Japan.

5496 (DOE/EIA—0185-80) Costs and indexes for domestic oil and gas field equipment and production operations, 1980. Funk, V.T.; Anderson, T.C. (Department of Energy, Washington, DC (USA)). Energy Information Administration. Feb 1981. 196p. NTIS, PC A09/MF A01. Order Number DE81029785.

Domestic oil field and gas field production equipment and direct annual operating costs and indexes are presented for 1980. Also, linked index numbers for 1979 and 1980 are shown together with the 1980 costs for each component. Costs and indexes for primary operations in six areas, secondary operations in one area, primary operations in the Gulf Coast offshore area, and gas well operations in six areas are detailed in the 119 appendix tables. Between midyear of 1979 and midyear 1980, the indexes for oilfield equipment costs increased 15.7 percent for primary, and 15.6 percent for secondary recovery production. Direct operating costs for these categories rose 18.7 and 11.9 percent, respectively. Offshore operating costs for the 12-month period showed an 11.1 percent increase. Gas well equipping costs increased 13.5 percent while the operating costs increased 15.0 percent. During this same period the consumer price index rose 14.3 percent.

5497 (DOE/EIA—0206-79) Performance profiles of major energy producers 1979. (Department of Energy, Washington, DC (USA)). Energy Information Administration. Jul 1981. 117p. NTIS, PC A06/MF A01. Order Number DE81028468.

The purpose of this report is to examine year-to-year developments in the operations of 26 major US energy companies on a corporate level and also by major line of energy business and by major functions within each line of business. The period covered is 1977 to 1979. Comparisons of income and investment flow are featured and related to functionally allocated net investment in place. The presentation seeks to identify similarities and dissimilarities in results across lines-of-business activity or by firm size.

5498 (DOE/EIA-0239-80) Underground natural gas storage in the United States, 1980 to 1981 heating year (April 1980-March 1981). Koelling, G.W. (Department of Energy, Washington, DC (USA). Office of Oil and Gas Resource Applications). Aug 1981. 29p. NTIS, PC A03/MF A01. Order Number DE81029909.

As of March 31, 1981, the end of the 1980 to 1981 heating year, the nation had 5248 billion cubic feet of natural gas in its underground storage reservoirs. Of this total, approximately 69.2 percent was base, or cushion gas and 30.8 percent was working gas. Working gas in storage at the end of the 1980 to 1981 heating year totaled 1618 billion cubic feet, approximately 2.1 percent above that available at the beginning of the heating year. This increase resulted from an excess of storage injections over withdrawals (net injections) of 102 billion cubic feet during the heating year. These net injections also resulted in a 2.5 percent increase, to 3630 billion cubic feet, in the volume of base gas in storage. However, it should be noted that the total oil storage differs slightly from the sum of gas in storage at the beginning of the heating year and net injections during the year. This is due to changes and revisions in the quantities of native gas included in base gas and losses in base gas due to migration from storage reservoirs. All volumes of natural gas in this report are on a pressure base of 14.73 psia at 60 degrees Fahrenheit.

5499 (DOE/EIA-0297) Venezuela, Trinidad and Tobago: crude oil potential from known deposits. Dietzman, W.D.; Rafidi, N.R.; Warner, A.J. (Department of Energy, Washington, DC (USA). Energy Information Administration). Jul 1981. 127p. NTIS, PC A07/MF A01. Order Number DE81027023.

This report presents an analysis of the future oil supply potential from the known fields of the republics of Venezuela and Trinidad and Tobago. Presented herein are estimates of (1) original oil in place; (2) ultimate recovery; (3) remaining reserves; and (4) projected supply patterns. A discussion of the methodology for projecting supply patterns is also presented. This analysis does not include recoverable resources from nonconventional deposits such as tar sands and oil shale. The Republic of Venezuela ranked 7th in 1979 in production among the oil producers of the world and is one of the leading exporters of crude oil. During 1979, production averaged about 2.3 million (MM) barrels of oil per day (bopd). It exported an average of 1.2 MM bopd of crude oil in 1978 and 690 thousand (M) bopd of refined products during the first eleven months of 1978. Thus, it exported all but 12 to 13 percent of the petroleum produced in 1978; the rest is consumed domestically. About 1/3 of the country's exports are received by the United States, and it was the 5th and 3rd largest supplier of crude oil and refined products to the United States in 1978 and 1979, respectively.

5500 (DOE/ET/10033-T1) Analysis of the labor productivity decline in the US bituminous coal mining industry. Final technical report as of June 8, 1981. Hill, F.E.; Cook, F.X.; Herhal, A.J.; Krohla, B.J.; Manuel, E.H. (Ayers (Emory) Associates, Inc., New York (USA)). Jun 1981. Contract AC01-78ET10033. 163p. (FE-3120-2). NTIS, PC A08/MF A01. Order Number DE81028708.

This report describes national, regional, and state-level productivity histories for underground and surface coal mining (separately) during the period 1950 to 1977. The report also presents broad hypotheses regarding the causes of productivity decline.

5501 (DOE/LETC/RI-81-2) Bibliography of publications dealing with tar sands. (Department of Energy, Laramie, WY (USA). Laramie Energy Research Center). Sep 1981. 296p. NTIS, PC A13/MF A01. Order Number DE81026146.

To assist industry in the development of tar sands (oil sands), a compilation of technical reports, patents, journal articles and books has been prepared. The emphasis of this bibliography has been the US resource and its development. Also included are pertinent articles on non-domestic tar sand and related heavy oil resources and their development. The subjects included: geology and resource evaluation; chemical and physical properties; in-situ recovery;

upgrading and refining; history; environmental; and miscellaneous (includes general survey papers; resource development, health and safety, economics, etc.).

5502 (DOE/PE/70278-T17) Macroeconomics and oil supply disruptions. Hubbard, R.G.; Fry, R.C. Jr. (Harvard Univ., Cambridge, MA (USA). Energy and Environmental Policy Center). Apr 1981. Contract AC01-80PE70278. 124p. NTIS, PC A06/MF A01. Order Number DE81025580.

Energy-economy interactions and domestic linkages have been used in a system of models. Domestic economic aggregates are linked with a model of the world oil market by a core macroeconomic model with real and financial sectors. The model can be used to examine the policy ramifications of various short-run scenarios. Demand factors are not taken as exogenous to the world oil market, nor are oil prices taken as exogenous to the US economy. Simulations of the model have generated endogenous cycles in the world oil market; which then affect the US economy primarily through output and inflation channels. Policy simulation was centered around the short-run imposition of a disruption tariff. The disruption tariff exhibited at least some of the desirable features noted by its proponents, though it did not function as a shield against the short-run output loss forced by the disruption. One might also simulate the rebate of tariff revenues as a reduction in the social security payroll tax. Other possible simulations include the use of any of the fiscal and monetary instruments included in the model. The effectiveness of these other policy instruments will be examined in a later paper.

5503 (DOE/US-31017) DOE analysis of the appropriate size of the strategic petroleum reserve. (Wharton (E.F.A.), Inc., Philadelphia, PA (USA)). 30 Nov 1979. Contract AC01-81US31017. 76p. NTIS, PC A05/MF A01. Order Number DE81023577.

Conclusions of the analysis are: (1) US should proceed with the third 250 million barrels (MMB) in the Strategic Petroleum Reserve (SPR) to help assure adequate petroleum to maintain health, safety and national security in the event of a very severe interruption, and secondarily to reduce the severe economic impacts of even relatively small oil interruptions. (2) An SPR of a least 550 MMB is justified on other than economic grounds and that it should be developed as fast as possible to help assure that the US can survive a very severe interruption. A Primary Reserve of 550 MMB is necessary to assure petroleum for critical survival uses, including food, shelter, heat, medical care and national security. (3) The size of 550 MMB for the Primary Reserve assumes that the US could successfully reduce consumption of oil by 20 percent, through price increases, allocation and rationing, before critical needs were affected. A reduction of this size would entail major economic penalties in GNP loss and unemployment and would be very difficult to achieve, requiring a major improvement in the current capability of the government to implement such measures. (4) An additional 200 MMB in the SPR for a total of at least 750 MMB would be desirable to help avoid or reduce the economic losses caused by oil interruptions. A Secondary Reserve of this size would not be effective in avoiding all noncritical but painful economic losses because it would not be large enough to offset much of the cumulative oil shortfall in large interruptions and in smaller interruptions of extended duration. The economic impacts of a shortage of 200 MMB of oil in 1990 are estimated to be in the range of \$40 to \$50 Billion in GNP loss and 100,000 to 150,000 unemployed workers. (5) An incremental 200 MMB, for a total SPR of 750 MMB, would be economically beneficial.

5504 (EMD-81-45) Department of Energy needs to resolve billions in alleged oil-pricing violations. (General Accounting Office, Washington, DC (USA)). 31 Mar 1981. 72p. General Accounting Office, Gaithersburg, MD. Order Number DE81904052.

As of January 1981, the Department of Energy (DOE) had alleged over \$13 billion in oil pricing violations. However, only \$4.2 billion of this total has been resolved primarily because of oil industry legal challenges to DOE's regulations. Even when DOE was able to negotiate settlements with oil companies, it was generally unable to ensure that restitution was made to injured parties. Because petroleum pricing has been decontrolled and because most

alleged violations have not been settled, DOE needs to pursue its enforcement efforts to bring these violations to a fair and orderly resolution.

5505 Coal burning issues. Green, A.E.S. (ed.). Gainesville, FL; University Presses of Florida (1980). 398p.

The results of the scoping phase of an interdisciplinary assessment of the impact of the increased use of coal are reported in this monograph. Subject areas include: coal availability and coal mining; an energetics analysis of coal quality; coal transportation; coal burning technology; synthetic fuels from coal; technological innovations; water resources; atmospheric pollution; air pollution dispersion modeling; atmospheric modifications; solid waste and trace element impacts; agriculture; health effects of air pollution resulting from coal combustion; quantitative public policy assessments; financing capacity growth and coal conversions in the electric utility industry; coal and the states - a public choice perspective; and federal regulatory and legal aspects.

5506 Unconventional gas production and associated equipment markets. New York, NY; Frost and Sullivan, Inc. (1980). 243p. \$975.00.

This report analyzes and forecasts the demand for unconventional gas by type through the year 2000. Tight sands gas, Devonian shale gas, coal bed methane gas, and geopressed aquifers are analyzed separately. The geographic locations of each are given. Major recovery methods are described. Gas in place and recoverable estimates are presented for the various types of unconventional gas and by specific location in various basins. Recovery estimates by unconventional gas type derived from various studies, and adjusted for price assumptions, are detailed. Various scenarios are considered. (DMC)

5507 Bushel of wheat for a barrel of oil: can we offset OPEC's gains with a grain cartel. Luttrell, C.B. *Federal Reserve Bank of St. Louis Review*; 63: No. 4, 13-21 (Apr 1981).

Among the proposals for retaliating against OPEC prices and production cuts is a grain cartel that will match a bushel of wheat for a barrel of oil. The concept is not valid, however, because the grain market does not have the particular economic conditions which allow OPEC to succeed. Cartels are able to charge higher prices than a competitive industry, but the profit-maximizing rate of output will be less. A US grain cartel would be ineffective because a rise in prices would only result in increased world production by non-cartel members. A food cartel would also harm less-developed countries and would increase famine. 19 references. 5 tables. (DCK)

5508 (LA-8936) Tar sand: a petroleum resource of the future. Aamodt, P.L.; Freiwald, J.G. (Los Alamos National Lab., NM (USA)). Jul 1981. Contract W-7405-ENG-36. 9p. NTIS, PC A02/MF A01. Order Number DE81028379.

Tar sand deposits that are 7% bitumen by weight, more than 10m thick, and less than 50m below the Earth's surface now have potential for near-term development. The amount of recoverable crude oil in US deposits could offset US petroleum imports for about 10 to 15 years. A comprehensive program is needed to define the areas and characteristics of US deposits and to develop new efficient and economical methods of in situ recovery, including thermal and nonthermal mobilization and combinations of conventional and novel extraction techniques.

5509 (LA-UR-81-2309) Viewpoint on occupational health in the oil-shale industry. Voelz, G.L.; Grier, R.S.; Hargis, K.M. (Los Alamos National Lab., NM (USA)). 1981. Contract W-7405-ENG-36. 10p. (CONF-810838-1). NTIS, PC A02/MF A01. Order Number DE81028698.

From Conference on oil shale, the environmental challenges II; Vail, CO, USA (10 Aug 1981).

In assessing the potential health and safety hazards which may be expected in a large-scale oil shale industry, the types of operations that will be utilized to extract oil from oil shale are examined. These are broadly characterized as mining, raw shale processing and handling, retorting and refining, and spent shale disposal. With few exceptions, these operations in shale oil production are similar to operations in existing industries. Health and safety risks

and occupational health problems are also expected to be similar. To date medical studies on workers in the oil shale industry who have been exposed to shale dusts and oil products have indicated that the chief problem areas are pneumoconiosis and skin cancers. A broad viewpoint of the prospective occupational health problems in the oil shale industry can be obtained by reviewing similar activities and exposures in other industrial operations. This viewpoint would suggest that the prospective problems can be controlled adequately by conventional methods of worker protection. Several unique situations do exist in this industry. The mining and material handling of tonnages of oil shale exceeds any experience in other mining activities. This is a problem of scale. It seems unlikely that it will produce new safety problems. The in situ mining offers the unique situation of burning and abandoned underground retorts in near proximity to work forces preparing future in situ retorts. The potential of exposures to dusts, gases and vapors will simply have to be measured as such operations come on stream. Measurements made to date have not shown unique hazards to exist, although existing data are limited to demonstration-scale retorts burning one-at-a-time under normal conditions.

5510 (ORNL-5722) Impact of environmental control costs on an indirect coal liquefaction process. Johnson, P.J.; Wham, R.M.; Singh, S.P.N.; Fisher, J.F. (Oak Ridge National Lab., TN (USA)). Aug 1981. Contract W-7405-ENG-26. 218p. NTIS, PC A10/MF A01. Order Number DE81026541.

This report examines the effect on product price of three different scenarios for the control of emissions to the environment by a conceptual, commercial indirect coal liquefaction facility. The plant design utilizes Lurgi dry-ash gasifiers operating on western, subbituminous coal to provide synthesis gas for low-pressure methanol synthesis and subsequent conversion of the methanol to gasoline. Levels of emission control, which are based as much as possible on existing regulations for analogous processes, range from minimal control to more stringent control than that currently in effect. The use of several emission control options and the reduction of plant size are also examined in regard to their effects on product price. Environmental control to current levels would account for 12% of the product price for the facility assumed here. More stringent emission standards would produce an additional 3% increase. Reducing plant size would also raise product price. Two unpredictable factors having the greatest impacts on product price, however, are inflation and the method of financing. It should be noted that emission control requirements could be postulated which would substantially change the assumed plant design and, consequently, the assumed service factor and the calculated product price.

5511 (ORNL/EIS-171) Environmental compliance program handbook. (Oak Ridge National Lab., TN (USA)). Aug 1981. Contract W-7405-ENG-26. 332p. NTIS, PC A15/MF A01. Order Number DE81030226.

As a part of our country's effort to achieve energy independence, the Department of Energy (DOE), Fossil Energy, has conducted a research and development program to provide technology that will permit rapid commercialization of the processes for converting coal, and other solid fossil fuels, into products to substitute for those derived from natural gas and oil. As an integral part of this effort, the DOE has taken the position that all projects involving fossil fuels be in compliance with applicable state and federal governmental laws and regulations. Only by demonstrating that these new technologies can be built and operated without adverse environmental impact can these technologies be considered as proven and ready for commercialization by the private sector. This handbook is one of a series covering federal laws and regulations and the laws and regulations of selected states that pertain to air quality, water quality, and the identification and disposal of solid and hazardous wastes. The data summary sheets are part of a computer file built for DOE by Oak Ridge National Laboratory. This handbook identifies and provides abstracts to those pertinent laws and regulations which were in force in the State of Ohio in early 1980. The permit forms are those in use during that time frame. Concerns about possible changes and additions to applicable laws and regulations occurring since 1980 should be directed to the Ohio Department of Environmental Protection.

5512 (P-150-81-001) Administration of the state fuels set-aside. Annual report to the Legislature. (California Energy Resources Conservation and Development Commission, Sacramento (USA)). Jan 1981. 84p. California Energy Commission, Sacramento, CA. Order Number DE81903672.

In response to the oil embargo of 1973-74, the United States Congress passed, and the President signed into law, the Emergency Petroleum Allocation Act of 1973, PL 93-159. This law gave broad fuel regulation powers to the predecessor of the United States Department of Energy and allowed limited delegation of administrative authority to the states. During the embargo, California accepted the federal delegation to establish and operate a state gasoline set-aside. The set-aside allows state government to allocate a limited amount of fuel directly to users experiencing a hardship or emergency caused by a fuel shortage. Originally the responsibility of the California Department of Conservation's Division of Oil and Gas, in 1974-75 the program was transferred to the Resources Agency. After the effects of the embargo dissipated, the gasoline set-aside was not extensively used again until early 1979. This report is a detailed discussion of the Commission's administration of the state set-aside between March 1979 and January 1981. In light of pending fuel shortages, in March and April 1979 the Governor and the Energy Commission reactivated the gasoline set-aside and established a diesel set-aside. During the most recent 1979-80 shortage, the diesel set-aside was the most heavily used. It was exhausted in July, August, and September of 1979. A comparable number of gallons were allocated from gasoline set-aside, but it is over five times the size of the diesel set-aside, and thus was never depleted. The Commission has received very few applications for propane set-aside. The majority of set-aside recipients are in the agricultural industry. More than half of all diesel and one-quarter of all gasoline gallonage went to this sector. Many nonagricultural industry groups also apply for and receive set-aside. The construction industry, for example, is the largest second priority class. (DMC)

5513 Burning questions about natural gas. Velocci, T. *Nation's Business*; 69: No. 6, 23, 25-28 (Jun 1981).

Natural gas discoveries may provide a way to relieve US dependence on OPEC oil. An exploration surge raised reserve estimations after new government policies relaxed market regulations and began a phased decontrol of prices. Controversy continues between the industry, regulators, and consumers over the possibility of expediting the decontrol process. The Fuel Use Act and the Natural Gas Policy Act of 1978 will shape deregulation policies, even though they were written when gas was thought to be reaching depletion and are now out of balance with present reserve estimates. (DCK)

5514 Appalachian coal turns green. Tracy, E.J. *Fortune*; 104: No. 2, 72-75 (27 Jul 1981).

The expectations of coal-industry executives over the strike settlement and the new administration's plans to remove regulatory burdens have yet to be translated into increased population. A ton of coal costs roughly the same as a barrel of oil, but yields four times the energy; however, mining coal at this price does not yield an acceptable profit. A slower growth in electrical-energy output, which accounts for 70% of the coal market - with hesitation on the part of utilities to convert to coal because of pollution laws - explain some of the disappointing progress. The Appalachian coal region, where the industry is thriving, is the exception. While Appalachian coal's high Btu content and low sulfur content combined with its proximity to major markets gives it an economic advantage, it is the exports to meet a large European demand for steam coal that have created much of the boom. Small underground mines, which operate under principles of labor intensity, are the most efficient. Young people are attracted by the camaraderie, good pay, and pride in the work of small operations. Overcapacity may eliminate some of the profitability of the larger operations as price rises will spur an increase of supplies. (DCK)

5515 New oil contract escalator seen cutting NYC fuel bills. Smith, T. *Energy User News*; 6: No. 30, 1, 19, 21 (27 Jul 1981).

An escalator clause in its new fuel-oil contracts could save millions of dollars for New York City as well as other cities which will now negotiate similar clauses. Suppliers had to submit a base

price per gallon and a percentage of any oil price increase that they would absorb in their contract bids. The final bids will require New York to pay only 13% of No. 6 oil escalators and 17.6% for No. 2 oil. The shared escalator clause allows city budgeters to prepare for fuel costs with confidence. Some bidders increased their base price and others their escalator price to compensate. Those with a low base price will be using the future market to keep prices lower. Some suppliers are unhappy because they cannot get the same kind of protection from their own suppliers. The new competition is credited to the lifting of price and allocation controls and the diversification of crude-oil sources. (DCK)

5516 Figuring on energy: politics of drawdown. Schaffer, P. *Energy User News*; 6: No. 28, 14-15 (13 Jul 1981).

Political pressures to underprice heating oil and diesel fuel after decontrol and the touchy issue of large oil-industry inventories indicate that oil companies lack complete control. Arguments for drawing down inventories forget that the 1978 drawdown to reduce imports left the US vulnerable to 1979 shortages and increased dependence on imports. The high opening stock levels and weak prices of 1981 encouraged a Harvard team to recommend another drawdown without public discussion. The debate indicates a need for inventory policy and a consensus on the definition of crisis. Refiners are lowering inventories now because of high interest rates and the terms of crude-oil purchases, although the inventories are no higher than those of a year ago. It is the economic picture, not the energy picture, which has changed to make it too costly for companies to store large inventories. A public dialogue should consider how to finance these inventories. (DCK)

5517 European natural gas: exploration urged as alternative to Siberian pipeline. Hefner, R.A. III. *EUROPE*; No. 226, 27-29 (Jul 1981).

The author says he read with amazement the reports of negotiations for Western Europe to purchase natural gas from the Soviet Union - including pipeline construction - because Central Europe probably overlies a significant reserve that it could develop and control. Geological evidence and common sense suggest that the proved Lacq field in France is only a portion of a larger field in the Aquitaine Basin, whose potential should first be explored. Unfortunately, common sense does not always prevail at first, as witness the US looking elsewhere before exploring deep sedimentary beds when supplies seemed to be running out. Sedimentary beds below 15,000 feet in the US proved to contain vast reserves that can be recovered using available technology. This required a revision of policies that had assumed depletion. The author feels that Western Europe could study the approach taken by US companies and set economic policies that will match world prices and generate the capital for exploration and development. The strategic and economic benefits warrant looking for this potential resource before becoming dependent on Soviet gas. (DCK)

5518 Public choice of price control and rationing of oil. West, E.G. (Carleton Univ., Ottawa, Ontario); McKee, M. *Southern Economic Journal*; 48: No. 1, 204-210 (Jul 1981).

The Buchanan and Tideman (B/T) geometric analysis (Atlantic Economic J., 2 (1974)) is shown to overestimate consumer surplus resulting from price control because of subsequent shifts in supply. An extension of the model reduces the surplus even more when it considers the voter's costs of subsidizing imported oil and conducting a rationing program. The effects of the Windfall Profits Tax are also overestimated by the B/T analysis because voters will not support policies that will ultimately injure them. Voters will support controls only until they become aware of how supplies respond to price. 5 references. (DCK)

5519 Effective tax planning for Mexican operations. Smith, W.J.A.; Rodriguez, E. (Peat, Marwick, Mitchell & Co., Houston, TX). *Oil and Gas Tax Quarterly*; 29: No. 4, 685-693 (Jun 1981).

Differences in Mexico's economic and tax systems make it important for foreign investors in oil and gas development to understand these protective policies and investment barriers. American investors, for example, should plan for technology-based opportunities. Among the tax opportunities described are those dealing

with sale selection, type of ownership, foreign tax credits, income sourcing, and the use of a Domestic International Sales Corporation (DISC). (DCK)

5520 Taxation of coal: an update. Stewart, R.R. Jr.; Stevens, B.J. (Deloitte Haskins & Sells, Denver, CO). *Oil and Gas Tax Quarterly*; 29: No. 4, 694-715 (Jun 1981).

The coal-mining industry is subject to a myriad of tax laws, regulations, and rulings. Recent developments in the area of coal mining have resolved some past conflicts and further confused others. Nevertheless, a taxpayer involved in any aspect of coal mining should carefully analyze both tax and nontax implications related thereto. There can be benefits for the taxpayer who considers the structure of the transaction, the timing and method of acquisition, classification of exploration and development stage costs, and the interaction of depletion, Section 631(c), and the concept of economic interest. 71 references.

5521 Nonperformance in oil contracts. Trakman, L.E. (Dalhousie Univ., Halifax, Nova Scotia). *Oil and Gas Tax Quarterly*; 29: No. 4, 716-750 (Jun 1981).

This article identifies the extent to which a regime of law is necessary to displace the international crude oil contract of sale in the event of conflicts over nonperformance. The investigation suggests that multinational oil companies usually use their own internalized methods of regulating nonperformance through their own agreements of sale. Nonperformance clauses have been developed in the light of both legal and trade environments, not through the premature recourse to extraneous adjudicative processes. So long as multinational oil companies have been able to regulate such obligations by their own means, rules of law have subsisted as nonmandatory instruments of control in the oil industry. Adjudication has evolved into an active force of control only where multinationals have been unable to regulate nonperformance by means of their crude oil contracts and by recourse to their own oil usages. This study advocates the value of economic-legal analyses in assessing the effectiveness of business and legal controls over nonperformance. Behavioral studies are powerful devices in identifying conflicts between law and practice in international crude oil sales. In concluding, two principal contentions are advanced. First, nonperformance risks are usually dealt with very adequately by the oil parties themselves and should therefore be left principally within their domain as a matter of business and legal sense. Second, where a legal tribunal is charged with jurisdiction to regulate disputes over performance, that body should establish the most economic and fair allocation of nonperformance risks in the light of commercial realities, not legal suppositions. 34 references, 3 figures.

5522 Financial disclosures for oil and gas producers. King, B.G.; Brock, H.R. (North Texas State Univ., Denton). *Oil and Gas Tax Quarterly*; 29: No. 4, 759-780 (Jun 1981).

Pronouncements of the Securities and Exchange Commission (SEC) and the Financial Accounting Standards Board (FASB) over the past several years have resulted in much confusion regarding financial disclosures by oil and gas producers. Disclosure requirements have been announced and subsequently revised, amended, or suspended. It is hoped that the SEC's integration project will serve to resolve some of this confusion. However, the recent announcement that the FASB, with the expressed approval of the SEC, is undertaking yet another project to develop disclosure requirements for oil and gas producers suggests that the problem is far from solved. The summary of disclosures presented in this article may be of help to those who are presently faced with the problem of preparing financial reports with appropriate disclosures. It should also give an insight into the types of disclosures that ultimately will be required. 5 figures, 8 references.

5523 Refinery mix in the US, Canada, and the EEC. Dahl, C.A. (Univ. of Wisconsin, Milwaukee). *European Economic Review*; 16: No. 2/3, 235-246 (Jun 1981).

This paper examines the response of gasoline's share of a barrel of crude oil to changes in relative petroleum-product prices. An inter-country comparison of the US, Canada, and the European Economic Community (EEC) allows investigation of different parts of the production possibility frontier. In the US and Canada, with

relatively large amounts of cracking capacity, there is price responsiveness of the product mix to changes in relative product prices. In the US, both residual and distillates are substitutes in production for gasoline, but for Canada, only distillate is a substitute. Part of this difference is attributed to the US oil quota. For the EEC, with relatively small amounts of cracking capacity, there was no discernible effect of product prices on product mix. 22 references, 1 figure, 3 tables.

5524 Simple macroeconomics of an oil-dependent economy. Bhandari, J.S. (Southern Illinois Univ., Carbondale). *European Economic Review*; 16: No. 2/3, 333-354 (Jun 1981).

This paper constructs and analyzes a simple macrodynamic model of a small economy that is completely dependent upon OPEC for oil imports. The impact and dynamic behavior of wages, prices, output, and exchange rates is analyzed under several alternative scenarios. Initially, it is assumed that oil is denominated in dollars and the consequences of an increase in oil prices are investigated under a system of free floating. In later sections, the effects of this disturbance are re-examined under various kinds of managed float systems. 21 references.

5525 Exxon gets serious about shale. Tracy, E.J. *Fortune*; 103: No. 10, 62-64 (18 May 1981).

Exxon is undertaking a new industry in developing shale-oil resources in western Colorado's Piceance Basin. Exxon is proceeding with a 60% interest in the \$3 billion Colony Project that will produce 47,000 barrels of shale oil a day, even though some environmental concerns continue. This first effort reflects the 24% drop in Exxon's proved conventional reserves in recent years. Construction work is underway, and boom-town conditions are already evident in nearby towns. Successful testing of above-ground retorting processes and over 50 required permits are in hand. The Tosco Corp. owns the remaining 40% of the project. No government subsidies are sought, keeping the project independent of budget cuts. Other oil companies will also begin shale-oil development in the area. (DCK)

5526 Alaska natural gas may never reach the Lower 48 if the price is too high. Corrigan, R. *National Journal*; 13: No. 19, 833-836 (9 May 1981).

Unless construction financing can be found for the 745-mile Alaska link of the gas pipeline, the delivered price may be too high for the market. Northwest Energy Co. and 10 other gas-pipeline companies continue to negotiate, but they have been unable to raise construction funds. They are hoping producers will participate in the financing, but the producers will also want to share in the ownership. Although construction on the two legs of the pipeline is progressing, the Canadian government wants assurances that the Alaskan section will be built so that Canada will not become an energy farm for the US. If private financing is not forthcoming, the companies will ask for government help in the form of loan guarantees. The Reagan administration, however, insists upon private financing. Construction timing has been delayed during the regulatory negotiations, which began during the Carter administration. Some involved in the pipeline are confident that neither the US nor Canada will forego construction even if government assistance is required. (DCK)

5527 Regulation of coal surface mining in a Federal system. Edgerton, T.D. (North Carolina State Univ., Raleigh); Menzel, D.C. *Natural Resources Journal*; 21: No. 2, 245-265 (Apr 1981).

This article examines the dynamics of intergovernmental politics associated with the implementation of the federal program for regulating the surface mining of coal in the United States. This is accomplished by defining Surface Mining Control and Reclamation Act (SMCRA) in relation to other federal environmental legislation and developing a conceptual framework for the analysis of state-federal relationships which have been established by the regulatory mechanism embodied in the act. This analysis concludes that the effectiveness of the principle of cooperative federalism as a policy-management tool is conditioned by the particular implementation strategy adopted by the Office of Surface Mining (OSM) authorized to develop and enforce the provisions of the legislation, and the relationships developed between it and state agency coun-

terparts. The manner in which the agency defines key provisions of the act and the style used to provide incentives and invoke sanctions are critical to the evolution of a genuine partnership between state and federal units of government. 2 tables.

5528 Incidence and effects of the crude oil Windfall Profit Tax. McDonald, S.L. (Univ. of Texas, Austin). *Natural Resources Journal*; 21: No. 2, 331-339 (Apr 1981).

If it is true that domestically-produced oil is perfectly elastic at world prices and will not be affected by the Windfall Profits Tax, the burden will fall on oil operators and landowners instead of on domestic oil consumers. The result will be to increase the cost to landowners overtime and to decrease domestic production relative to imports. Resource allocations will also be distorted and tax revenues will accrue to state governments instead of the national treasury. Simple deregulation alone would have the desired effect of increasing production and reducing imports. 3 figures. (DCK)

5529 Energy crises in historical perspective. Nash, G.D. (Univ. of New Mexico, Albuquerque). *Natural Resources Journal*; 21: No. 2, 341-354 (Apr 1981).

A cursory survey of selected oil crises in America's past reveals certain similarities. Throughout the 20th century, the United States has lacked a clear coherent national energy policy. With the exception of war years, public policy was composed of a succession of disparate responses to immediate or short range problems. That this policy did not result in a major breakdown in American oil supplies was dependent on the timely discovery of hitherto untapped resources, either in the US or overseas, particularly in the Middle East. As the world's most-affluent nation in the 20th century the US was cushioned from the shock of a severe oil crisis. Whether the US can continue to rely on such luck in an era of restricted rather than seemingly unlimited petroleum resources is obviously problematical. The need to formulate a comprehensive national energy policy would not necessarily mandate a greater federal involvement in the management of the nation's energy resources. Rather, it would crystallize a clear understanding of national goals and priorities in relation to the use of energy. And no less important, such a program would need to be explained in an effective manner to the American people. National policy would delineate the respective roles of private and public enterprise in the achievement of these goals. Unless vast new petroleum reserves are discovered, without a clear national energy policy and sense of direction, the US will face the most serious energy crisis in its history.

5530 Coal leases held real property. Bird, T.C. *Natural Resources Journal*; 21: No. 2, 415-417 (Apr 1981).

Coal leases, which granted an exclusive, 20-year right to mine and dispose of coal, and provided for 20-year renewal options, held community real property so that any lease conveyance was void unless joined in by both spouses. In Padilla vs Roller (94 NM 234, 608 P.2d 1116 (1980)), the court confronted the question of whether the transfers of a coal lease were void for the failure of the conveyors' wife to sign the transfer document. In a terse opinion written by Justice Federico, the New Mexico Supreme Court analogized the Padilla case to earlier cases involving other mineral leases. The court pointed out that oil, gas, and mineral leases had been held to be real property. The case of Terry vs Humphreys (1922) established that an oil or gas lease extending over a period of more than five years represents real property of the community and, consequently, requires the joinder of both spouses for its valid conveyance. The Padilla decision, in light of relevant case law, represents a consistent extension of the Humphreys rule. The terms of the leases involved in Padilla were similar to the terms of the leases construed in earlier cases. The fact that coal, rather than oil or gas, was at issue afforded no reason for barring the application of the rule. The Padilla decision, then, is a reasonable extension of well-established law into an increasingly significant area of resource development.

5531 Strategic Petroleum Reserve: an economic perspective. Holcombe, R.G. (Auburn Univ., Ala). *Military Engineer*; 73: No. 472, 89-92 (Mar-Apr 1981).

The Strategic Petroleum Reserve was designed to cushion the U.S. from another OPEC oil embargo. Of the 500 million barrels of oil planned for this reserve, 91 million barrels are in storage.

Some questions, however, are raised. No clear strategy has apparently been considered for its optimum drawdown in the event of an embargo. Moreover, analysis shows that simply replacing all of the embargoed oil without affecting the demand patterns that exist during an embargo would only eliminate between 22 and 55% of the total economic losses that would occur because of the embargo. Demand-induced effects are caused by psychological uncertainties of consumers about the future.

5532 Gas demand in severe weather: aspects of forecasting and planning. Lyness, F.K.; Whitting, I.J. *Gas Engineering and Management*; 21: No. 2, 47-58 (Feb 1981).

Forecasts of gas demand are a key element in balancing the demand and supply for gas which is at the core of the industry's operational and planning activities. Such forecasts are strongly influenced by assessments both of the likely patterns of weather that might be experienced and of the relationship between weather and gas demand. In this paper, attention is concentrated on those aspects of weather and gas demand (in the United Kingdom) which are most relevant to the medium-term planning of markets and of investments in the supply system. The statistical techniques referred to in the paper are a necessary element in drawing the most reliable conclusions from the data, but it will also be evident that a good deal of judgement has to be applied in their application. 9 refs.

5533 Water for oil shale: framework for the legal issues. Robinson, C.; Walta, M.E. *Denver Law Journal*; 58: No. 4, 703-714 (1981).

While current world oil prices make development of Colorado's oil-shale reserves economically feasible, political conflicts in the Middle East and other parts of the world make such development an economic and geopolitical necessity. The magnitude of Colorado's future oil-shale industry is still speculative, but there is no doubt that it will be substantial. Large-scale oil shale development will place new demands on the state's limited water resources. While this demand will develop over a period of years, present planning for an orderly and adequate supply is essential. Even less certain are the long-range impacts of oil shale development on the quality of the state's water resources. Because the magnitude of shale development is unknown and the water impacts uncertain, a multitude of legal problems will surface as the oil-shale industry seeks adequate and dependable supplies of water. These legal problems are further compounded by the labyrinth of federal regulations and Colorado's specialized water-law system. Ultimate resolution of these legal questions by the courts will significantly influence Colorado's role in helping the United States achieve energy independence. 95 references.

5534 Oil shale and water quality: the Colorado prospectus under federal, state, and international law. Dempsey, P.S. (Univ. of Denver Coll. of Law, CO). *Denver Law Journal*; 58: No. 4, 715-749 (1981).

Oil-shale exploration and development is a rational political and economic solution to US energy needs, but it could pose severe water-pollution problems. Three separate legal entities - state, federal, and international - with legitimate interests have created a complex regulatory system for the Colorado River. Besides the administrative complexities, these three levels of permitting may not ensure the protection of either water rights or water quality. A consolidated permit process to eliminate both overlapping and gaps will require more cooperation and standardization. A single entity could also be selected for final oversight, or market approaches to pollution used instead of current regulations. Whatever regulatory approach is chosen for oil-shale development, it must balance energy and environmental needs. 244 references. (DCK)

5535 Effect of water law on the development of oil shale. Laitos, J.G. (Univ. of Denver Coll. of Law, CO). *Denver Law Journal*; 58: No. 4, 751-781 (1981).

Before the water-intensive oil shale industry can proceed on a large scale, the serious problem of water availability must be studied and solved. This review and analysis of significant water law issues that will affect oil shale development in Colorado is written from the perspective of a company or organization that wishes to engage in commercial-scale oil-shale production. It stresses the need for a large and relatively reliable supply of water to support the

production effort. Water used for Colorado oil-shale development projects will most likely originate in Colorado, either from the state's surface waters or its ground-water supplies. This article, therefore, has as its primary focus the law governing Colorado surface and subsurface water and this law's effect on the developer's decision to engage in oil-shale development. Recognizing that these traditional water sources - surface and subsurface - may be enhanced both by water-law doctrines and by hydrologic technologies, the latter half of the article analyzes how such enhancement may affect the oil-shale developer's range of choices. 230 references.

5536 Will oil imports be available; and at what price. Rustow, D.A. (City Univ. of New York, NY), pp 9-14 of *Environment, Energy, public policy: toward a rational future*. Axelrod, R.S. (ed.). Lexington, MA; D.C. Heath and Company (1981).

From Conference on energy and environment; Garden City, NY, USA (8 Jun 1979).

The author first attempts to dispel some of the myths that sprang up during the energy crises in 1973-1974 and 1979-1980. OPEC has been the price setter not only for the global oil market but also (to some extent) for energy in general. The true problem is that there is an oligopolistic structure in the world energy market in which OPEC, non-OPEC oil exporters, the oil companies, coal and uranium producers, and the patent holders on shale-retorting and coal-liquefaction processes all participate. The author says the solution lies in smaller cars. (DLC)

5537 Anthracite coal shortages. Hearing before the Subcommittee on Energy and Mineral Resources of the Committee on Energy and Natural Resources, United States Senate, Ninety-Seventh Congress, First Session. Washington, DC; Committee on Energy and Natural Resources (1981). 168p. GPO.

Purpose of this hearing is to make a candid assessment of the feasibility of using anthracite coal instead of heating oil in homes, particularly in the Northeast, and of the potential contribution of anthracite coal to the residential market. (DLC)

5538 Intergovernmental restraints on oil and gas developments. Gill, R.J. Jr. (Wexpro Co., Salt Lake City, UT). *Land and Water Law Review*; 16: No. 2, 457-499 (1981).

This presentation briefly examines the authority among the various levels of federal, state and local governments and highlights apparent practical and economic constraints on oil and gas development in the Overthrust Belt. Some of the problems presented will not lend themselves to easy resolution short of legislation or constitutional revision; others have solutions suggested. (PSB)

5539 Surface owner's estate becomes dominant: Wyoming's surface owner consent statute. Reese, T. *Land and Water Law Review*; 16: No. 2, 541-558 (1981).

This comment discusses the constitutionality of Wyoming's surface owner consent law in three areas. The first is whether Wyoming's statute is an unconstitutional taking without compensation of the dominant position of the mineral estate holder. The second theory will be that the federal government has preempted the area of mineral lands regulation and therefore Wyoming's statute is void. The third theory is that Wyoming's statute is unconstitutional because it denies equal protection of the law under the fourteenth amendment to the US Constitution. This comment will deal primarily with the reservations of mineral rights under lands the federal government disposed of to private interests. It will not deal with reservations of mineral estates by private parties.

5540 World oil and cold reality. Benard, A. *Harvard Business Review*; 58: No. 6, 91-101 (Nov 1980).

Faced with the fact that the oil-exporting countries now call the tune in supply and price, can their customers act to alter their profligate consumption habits and develop oil substitutes. Can they embark on a period of restructured growth and leave behind their world of internal contradictions (as this article terms them), in which every sneeze by an OPEC nation seems to produce an economic cold at home. The author of this article, a top oil company executive, voices some pessimism about the outcome in the medium

term. He projects scenarios for the production of oil and other energy sources in the next two decades. Using scenarios from his company's well-regarded planning staff, the author shows ranges of availability in which price has lost its conventional influence in the supply-demand equation. The conclusions are not encouraging for oil consumers.

5541 Petroleum: too valuable to burn. Flavin, C. (Worldwatch Inst., Washington, DC). *SciQuest*; 53: No. 9, 18-21 (Nov 1980).

Oil and natural gas are essential raw materials for petrochemical production, and alternatives are not readily available. Other sectors of the economy should develop alternatives or more-efficient usage. Today, replacing synthetic with natural materials would often require more, not less, energy. Many natural sources are limited or increasingly expensive. Petrochemicals may become increasingly important, but having to compete for available hydrocarbons also raises their prices. Nations must set priorities and direct the quantity and type of fuel supplies used by each sector. (DCK)

5542 Natural gas pricing: policy and impact on the local community. Massie, H.W. Jr. *Journal of the National Technical Association*; 54: No. 3, 44-49 (Sum 1980).

A study is performed to look at this history, present and future natural gas pricing policy. The question of whether a gas shortage exists will be discussed. Also, the impact on future gas prices and tradeoffs of increased gas prices vs employment caused by energy shortages will be assessed. The purpose of this paper is to highlight the effects of natural gas pricing policy and their impact on future jobs and energy availability.

5543 All the easy questions have been answered. Murray, F.X. (Georgetown Univ., Washington, DC). *Electric Perspectives*; 41-42 (Win 1980).

The debate over whether to rely on coal centers on the questions of acid rain and carbon dioxide buildup, neither of which is adequately understood. Scientific evidence that coal combustion causes these effects remains tenuous, but policy decisions must be made to either accelerate coal use to save the economy and national security or to avoid use to save the environment. Neither solution is risk-free, but efforts to develop a consensus are preferable to a choice by default. (DCK)

5544 Natural gas-retail. Grevenow, D.E. (Wisconsin Gas Co., Milwaukee), pp 88-96 of *Proceedings of the 1980 rate symposium on problems of regulated industries*. Columbia, MO; University of Missouri (1980).

From 1980 rate symposium on problems of regulated industries; Kansas City, MO, USA (10 Feb 1980).

Natural gas ratemaking at the distribution company level is discussed in this article. Marginal-cost pricing, lifeline rates, flat rates, inverted rates, seasonal rates, and benchmark rates are described. A detailed explanation of the auction rate is presented. (DMC)

5545 Incremental pricing. Thomas, J.P. pp 220-232 of *Proceedings of the 1980 rate symposium on problems of regulated industries*. Columbia, MO; University of Missouri (1980).

From 1980 rate symposium on problems of regulated industries; Kansas City, MO, USA (10 Feb 1980).

Incremental-cost pricing as outlined in the Natural Gas Policy Act is evaluated in this article. The author concludes that incremental pricing is merely a revenue assignment methodology to allocate a disproportionate share of gas cost, therefore revenue responsibility to industrial users. If implemented as proposed, the small user would not receive the protection which Congress envisioned. The benefits these customers currently derive from sales to industrial users would be driven off the natural gas system. (DMC)

5546 Natural gas rate design in Wisconsin. Miller, J.G. pp 244-260 of *Proceedings of the 1980 rate symposium on problems of regulated industries*. Columbia, MO; University of Missouri (1980).

From 1980 rate symposium on problems of regulated industries; Kansas City, MO, USA (10 Feb 1980).

The direction of natural gas rate designs in Wisconsin can be described and analyzed by reviewing the experience of Wisconsin Power and Light Company (WP & L) because the Wisconsin Public Service Commission (WPSC) used a WP & L natural gas rate case, as its test case to establish Wisconsin policy. This paper covers the proposed and ordered rate designs in this case, and includes a discussion of the costing methodologies and an analysis of customer response during the first year that these rates were effective. The end result of the WP & L test case was the establishment of WPSC policy which is now being implemented in various forms by the other natural gas utilities in Wisconsin. It is still too early to measure the impact these new and different rate designs have had or will have on customer's consumption decisions.

5547 Trends and issues in retail rate design: the Montana experience or the Montana Power Company experience. Haffey, J.D. pp 261-327 of Proceedings of the 1980 rate symposium on problems of regulated industries. Columbia, MO; University of Missouri (1980).

From 1980 rate symposium on problems of regulated industries, Kansas City, MO, USA (10 Feb 1980).

The cost assignment, rate class definition, and rate design orders by the Montana Public Service Commission to the Montana Power Company are discussed in this article. The rates prepared in compliance with the order and the rates existing just prior to the order are presented. What the order will mean to the customers of the utility in terms of gas prices is illustrated. The proceedings of the Hearing before the Public Service Commission November 19, 1979 are included. Data are presented on summer and winter billings. A financial statement of the Montana Power Company, natural gas cost information, cost of service information, and cost allocations are also presented. (DMC)

5548 Standby or supplemental rates. Smallwood, E.W. pp 328-333 of Proceedings of the 1980 rate symposium on problems of regulated industries. Columbia, MO; University of Missouri (1980).

From 1980 rate symposium on problems of regulated industries, Kansas City, MO, USA (10 Feb 1980).

The story behind a request for standby or supplemental rates by the Washington Gas Light Company is related by a representative of the company. These rates would apply to customers with electric heat pumps who only use gas for space heating at or near the system peak. These customers do not free up any pipeline demand, storage gas, peak shaving gas, nor facilitate the adding of new customers without the expanding of storage capacity. The question of whether or not an electric heat pump should be coupled with gas furnaces is also addressed. (DMC)

5549 Optimal oil-pricing policy for Saudi Arabia. Ham-moudeh, S.M. Lawrence, K.A.; Univ. of Kansas (1980). 305p. University Microfilms Order No. 81-11,734.

Thesis (Ph. D.).

The dissertation is comprised of three parts. The first part presents an institutional description of Saudi Arabia's and the world's oil industries and it analyzes the factor which are apt to shape the Kingdom's long-run oil-pricing policy. These factors include prices of alternative sources of energy cost of exhaustion opportunity cost of oil productive capacity, depletion cost and time preferences for oil revenues. The second part is a theoretical analysis of the Kingdom's optimal oil-pricing policy. In the final part, two of the theoretical models are applied and the long-run optimal oil prices are computed. In the first model, addition to oil productive capacity is exogenously determined. This model predicts that optimal domestic and export prices would increase every year throughout the exhaustion period, which is determined to be approximately 55 years. For this period, total benefit would equal approximately 921 billion dollars, in 1978 prices. A quantitative sensitivity analysis is also provided. The factors that have the greatest influence over the country's oil prices are the discount rate and prices of alternative sources of energy. In the second model, addition to capacity is endogenously determined. The model also predicts that prices would increase throughout the exhaustion period, which is estimated to equal 61 years. Total benefits are estimated to equal 906 billion dollars.

5550 Oil diplomacy: the Atlantic nations in the oil crisis of 1978-79. Philadelphia, PA; Foreign Policy Research Institute (1980). 150p. \$6.00.

Six essays examine how the US, Western Europe, and Japan have handled their common energy problems and to what extent their traditional cooperation has been enhanced or diminished by the OPEC actions. They explore the interdependencies of the developed countries, along with the strains that the energy crisis has placed on the search for common solutions. An introduction by Alexander Haig is followed by essays titled: The Permanent Crisis: Change in the World Oil System; The American Response: On-the-Job Training; Western Europe: A Fragmented Response to a Fragmenting Order; The West in Concert: A Very Complex Score; Politics of Dependence: Western Europe and the Arab-Israeli Conflict; Oil on Troubled Waters: The Industrial World and the OPEC; Oil and Money: A Note on the Western Financial Community; and Getting Out of the Crisis: excerpt of interviews. 2 tables. (DCK)

5551 International business conference: world energy outlook. Saint Louis, MO; Saint Louis University (1979). 89p. (CONF-7911141-).

From International business conference on world energy outlook; St Louis, MO, USA (16 Nov 1979).

Proceedings of the meeting are published in this volume. Representatives of the USA, Kuwait, the European Community, oil industry, coal industry, government, and academia presented papers at the conference. Separate abstracts have been prepared for items within the scope of the Energy Data Base. (DMC)

5552 OPEC: present and future responsibility. Jaffar, K.M. pp 2-9 of International business conference: world energy outlook. Saint Louis, MO; Saint Louis University (1979).

From International business conference on world energy outlook; St Louis, MO, USA (16 Nov 1979).

This article contains the text of the address given by the Kuwait Ambassador to the USA. It was pointed out that increasing oil prices alerted the people of the world to the deplorable nature of oil. At the same time higher oil prices not only brought about a new awareness of the need for energy conservation, but also helped to expedite development of alternative energy sources. The price of oil was unjustly frozen at a very low level for twenty years while prices of other commodities were escalating. He also argued that the present high oil prices were prolonging the life span of oil in order to cushion the transfer period to alternative energy sources, and to build a new economic base for OPEC countries in the post-oil era.

5553 Washington legislative outlook on energy. Eagleton, T.F. pp 11-16 of International business conference: world energy outlook. Saint Louis, MO; Saint Louis University (1979).

From International business conference on world energy outlook; St Louis, MO, USA (16 Nov 1979).

Senator Eagleton told the conference that the most traumatic effect of the new energy reality could be seen in the country's industrial base. He cited that because of higher prices of oil, Ford Motor Company's North American operations lost \$1 billion in 1979 and other automobile manufacturers laid off many workers throughout the country. He also mentioned that contrary to some critics, the windfall profit tax would not encourage oil companies to explore new production efforts, because the level of their profits are already high enough.

5554 Coal's participation in world energy supplies. Quenon, R.H. pp 18-31 of International business conference: world energy outlook. Saint Louis, MO; Saint Louis University (1979).

From International business conference on world energy outlook; St Louis, MO, USA (16 Nov 1979).

A brief summary of the current world energy situation is presented. The author forecasts that the decade of the 80's will see a continuation of growth in oil consumption. Although coal should play a much larger role as an alternative source of energy, coal production has been constrained by government regulation so that the US coal industry has been producing below capacity. Even ac-

counting for expensive scrubbers to control air pollution, it would be much cheaper not only for new power plants but also for existing oil-fired power plants to switch to coal rather than oil or gas. The importance of coal to the world's future energy supply is discussed. (DMC)

5555 Energy and the future: a crossroads for the world. McAfee, J. pp 35-44 of International business conference: world energy outlook. Saint Louis, MO; Saint Louis University (1979).

From International business conference on world energy outlook. St. Louis, MO, USA (16 Nov 1979).

Gulf Oil's view of the global and US energy situation is presented by a representative of that corporation. Three points are addressed: the present situation, the President's Actions, and the long-term solution. The author called for a global economic conference between oil-producing and oil-consuming countries in order to resolve the chaotic energy supply situation. He indicated that a solution to the world energy problem can be arrived at only by consultation and negotiation, not by unilateral action. He further indicated that the issue can be faced only by recognizing the global nature of economic and energy interdependence. It was pointed out that if OPEC embargoes or cuts back its production substantially, it could plunge the developed countries as well as the rest of the world into depression and chaos. This in turn would result in a loss of OPEC earnings, imperil their investments and set back their opportunities for development.

5556 MIT world oil project outlook. Paddock, J.L. pp 46-61 of International business conference: world energy outlook. Saint Louis, MO; Saint Louis University (1979).

From International business conference on world energy outlook. St. Louis, MO, USA (16 Nov 1979).

A statistical model which forecasts world oil markets and gives international perspectives is discussed. It separates consumer countries from producing countries and also separates the various sectors within the countries that use the energy. According to the MIT statistical model of world oil supply and demand, price should gradually clear the market. However, in reality oil prices are expected to follow an upward ratcheting pattern over time. The model focuses on the net demand on OPEC, and its impact on the price and GNP growth rate. The author's conclusion is that the Western countries will continue to depend on OPEC oil for the foreseeable future in spite of new supplies of alternative energy sources.

5557 American petroleum problems and the future outlook. O'Keefe, W.F. pp 63-70 of International business conference: world energy outlook. Saint Louis, MO; Saint Louis University (1979).

From International business conference on world energy outlook. St. Louis, MO, USA (16 Nov 1979).

The overall energy problems faced by the nation and the country's energy future are briefly addressed in this presentation. Discussed are: the current energy situation; divisions; reasons for our energy dilemma; energy illusions; the 1980's - a crossroad; future energy sources; energy planning; and reliance on the price system. The author mentioned that despite the recent oil embargo, the US has increased its dependency on imported oil and has not been successful in energy conservation efforts. He believes that the decision to decontrol crude oil was a major step in the right direction to increase the supply of oil production and investments in the related fields.

5558 European view of energy problems. Goppel, M. pp 72-77 of International business conference: world energy outlook. Saint Louis, MO; Saint Louis University (1979).

From International business conference on world energy outlook. St. Louis, MO, USA (16 Nov 1979).

The European view of the energy problem is presented in this article. Europe is dependent upon imported energy, particularly oil. Natural gas resources are limited and without new discoveries, production will soon peak. The stability of energy supplies is thus exposed to foreign events. To address problems in the world energy market, the European countries have limited their oil imports to the 1978 level of 9.4 million barrels a day. Resource development in other areas, particularly coal, is being undertaken. The

author suggests that the energy issue, being a common problem, should result in solidarity between industrialized countries in order to solve the problems and ensure the future of humanity. (DMC)

2950 Hydrogen And Synthetic Fuels

REFER ALSO TO CITATION(S) 5686

5559 (BNL-29520) Systems analysis of hydrogen/natural gas supplementation and separation. Beller, M.; D'Acerno, J.; Hermee, A. (Brookhaven National Lab., Upton, NY (USA)). Apr 1981. Contract AC02-76CH00016. 6p. (CONF-811007-5). NTIS, PC A02/MF A01. Order Number DE81021383.

From 2. world congress of chemical engineering; Montreal, Canada (4 Oct 1981).

The methodology for the study involved first selecting a specific site for the study, since using national estimates tends to obscure specific regional issues and problems which are critical to the evaluation of such concepts. After the selection of the site, the evaluation focuses upon specific potential markets for hydrogen, and then examines the mix of customers comprising these markets. This establishes the incentives and barriers in the market sphere. Finally, the pipeline infrastructure, its capability for use to store and transmit hydrogen, and the incentives and drawbacks in this area are studied. Preliminary specific conclusions that can be made are as follows: the regulatory problems are certainly not insoluble. If hydrogen, for fuel or non-fuel use or both, is eventually shown to be competitive or desirable by using the natural gas system, as opposed to a separate system, the incentives will lead to regulatory changes. There is sufficient use of both hydrogen and natural gas in potential hydrogen-consuming industries to overcome the problem of reinjection of natural gas into the pipeline after separation. Certainly, this is a non-problem if fuel cells penetrate the electrical utility market in situations where the utility provides both electric and gas service. However, this problem requires further study. The pipeline flexibility problem must be studied for each region of interest to determine the optimality for combined use. This will then lead to rate structure determinations. The economics of using natural gas pipelines with separation must be examined against those of dedicated new hydrogen lines, as well as other terminal onsite hydrogen production options. The overall system economics can be performed parametrically, regardless of the hydrogen sources.

5560 (BNL-29764) Potential supply of synthetic fuels from Alaskan hydroelectric power and coal. Steinberg, M.; Powell, J.R. (Brookhaven National Lab., Upton, NY (USA)). 1981. Contract AC02-76CH00016. 15p. (CONF-810933-1). NTIS, PC A02/MF A01. Order Number DE81025743.

From IGRC 1981 conference; Chicago, IL, USA (28 Sep 1981).

It is proposed to develop and utilize the large potential hydroelectric power resources in Alaska to produce hydrogen by the electrolytic decomposition of water and to combine the hydrogen with the large Alaskan coal reserves to produce synthetic liquid and gaseous fuels. It is estimated that in this manner, as much as 1.8 million bbls/day of gasoline or 6.2 billion SCF/day of substitute natural gas can be produced. The existing and projected Alaskan pipelines would provide the means of transporting the fuels to energy consuming load centers in the US. This development would move the US a considerable way towards energy independence as well as employing the material resources in Alaska in an efficient manner.

5561 Gasohol, economics, and passenger-transportation policy. Solomon, B.D. (Indiana Univ., Bloomington). *Transportation Journal* : 20, No. 1, 57-64 (Fall 1980).

The price and availability of oil will largely determine the future role of the automobile. Government-policy changes have been limited to automobile fuel-efficiency requirements, but this does little to counteract past policies that encouraged automobile use to the point where cars account for 92% of passenger miles traveled and 31% of the petroleum consumed. Gasohol policies, which were intended to address energy, agricultural, foreign, and environmental concerns, will probably promote fuel substitution in

the transportation sector at the expense of diesel fuel, electric vehicles, and other energy sources. The economics of deriving gasoline by saccharine or starch fermentation and by cellulose fermentation are computed. Other considerations include the regulatory costs of alcohol diversion for beverage purposes. 33 references, 2 tables. (DCK)

- 5562 Hydrogen storage in metal hydrides.** Reilly, J.J.; Sandrock, G.D. *Scientific American*; 242: No. 2, 118-122 (Feb 1980).

The storage of hydrogen as a metal hydride is discussed. Properties of some representative hydrogen-storage mediums (MgH_2 , Mg_2NiH_4 , VH_2 , $FeTiH_2$, $LaNi_5H_6$, liquid hydrogen, and gaseous hydrogen) are compared. Magnesium hydride, the more promising of the two binary hydrides, is thought to be only a borderline possibility as a hydrogen-storage medium at present. Of the three ternary hydrides listed the leading contender is iron-titanium hydride. It's main advantage over lanthanum-pentane nickel hydride is one of cost. All the metal hydrides listed have a higher hydrogen storage capacity than an equal volume of liquid or gaseous hydrogen has. Energy densities (watt-hours per kilogram) of various automotive power sources either already in existence or proposed are tabulated. Metal hydrides lag far behind gasoline in terms of energy density, but they are competitive with electric batteries in this respect.

2960 Electric Power

REFER ALSO TO CITATION(S) 5279, 5289, 5297, 5323, 5352, 5412, 5427, 5492, 5653, 5681

- 5563 New York Power Pool.** Gunderland, NY; Power Pool Control Center (ndj), 15p.

This brochure describes the New York Power Pool and how it works. (PSB)

- 5564 (ANL/CNSV-TM—76) Analysis of potential cogeneration impacts on electricity generation by the Central Maine Power Company.** Gillette, J.L.; Hub, K.A. (Argonne National Lab., IL (USA)). Apr 1981. Contract W-31-109-ENG-38. 36p. NTIS, PC A03/MF A01. Order Number DE81029991.

The potential effects of coal-fired cogeneration on the production requirements of the Central Maine Power Company were examined. Two types of cogeneration design - one utilizing a backpressure turbine, the other an extraction turbine - were studied. It was assumed that these facilities were constructed to satisfy the thermal requirements of the Keyes Fibre Company and to produce electricity that could be sold to the electric utility. The analysis included a single-year study of two different capacity-purchase options under consideration by the electric utility. An extended period was also analyzed so that the effects of demand growth and additions and subtractions of capacity on the cogeneration potential could be examined. It was found that some savings of oil could be realized with coal-based cogeneration, and that the quantity of such savings were somewhat dependent on the purchase option, the demand growth rate, and the cogeneration design. It was concluded that both cogeneration designs had some economic viability, but that the backpressure turbine type had a decided advantage due to its significantly lower heat rate.

- 5565 (CONF-810744—1) Empirical investigation of the rural cooperatives residential demand for electricity.** Maddigan, R.J.; Chern, W.S.; Gallagher, C.A. (Oak Ridge National Lab., TN (USA)). 1981. Contract W-7405-ENG-26. 31p. NTIS, PC A03/MF A01. Order Number DE81026521.

From American Association of Agricultural Economists annual meeting; Clemson, SC, USA (26 Jul 1981).

This study examines the Rural Electric Cooperatives' (RECs) residential demand for electricity using a simultaneous-equation, partial-adjustment model developed as a component of the Oak Ridge National Laboratory Rural Electric Energy Demand (REED) model. The residential sector is described by a pair of equations in which the quantity of electricity demanded and the average electricity price are endogenous. The structural equations are estimated using regionally pooled state-level, REC-specific

data for the period 1969 to 1977 for five regions. The results indicate substantial variability among regions in both the short-run and long-run response to changing prices, income and weather conditions.

- 5566 (CONF-8106137—1) Modular hydro dam approach to the economic development of ultra low-head hydropower.** Broome, K.R. (Gilbert Associates, Inc., Reading, PA (USA)). 1981. Contract AC07-76ID01570. 19p. NTIS, PC A02/MF A01. Order Number DE81027817.

From WATERPOWER 1981 conference; Washington, DC, USA (22 Jun 1981).

The solution to developing economical ultra low-head (10 ft. -6 ft., 3m-2m) hydropower lies in being able to reduce equipment and construction costs at new dams to less than \$4000/kW, while maintaining an operating efficiency of 80% or more. The purpose of this investigation was to explore the potential for developing economical new ultra low-head sites using an innovative concept known as the Modular Hydro Dam (MHD). This concept, combines the benefits of shop fabrication and installation of equipment in truck transportable, waterproof power modules, with prefabricated gate sections that can be located between the power modules. Lateral support to withstand the static head pressure is provided by an upstream tension cable system anchored at each bank. Foundation design for vertical support varies with subsurface conditions. The technical, economic, environmental, and institutional feasibility of the MHD concept were examined. The module selected contains an axial-flow type turbine, rated at 300 kW under a 10-ft head, a generator driven by a belt drive, vertical intake gate, and electrical control system and switchgear. Capital and operating costs are estimated. It is concluded that the US potential for power generation at ultralow-head sites justifies the development of the MHD concept, and that a full scale demonstration of the concept could be completed by 1986. (LCL)

- 5567 (DOE/CE—0007) Power and transmission-rate orders and related documents. Office of power marketing coordination: data compiled through December 1979.** (USDOE Assistant Secretary for Conservation and Renewable Energy, Washington, DC). Jul 1981. 145p. NTIS, PC A07/MF A01. Order Number DE81026903.

Prior to the establishment of the Department of Energy, power from Federal projects was marketed by five power marketing agencies under the Department of the Interior. These were the Alaska Power Administration (APA), the Bonneville Power Administration (BPA), the Southeastern Power Administration (SEPA), the Southwestern Power Administration (SWPA), and the United States Bureau of Reclamation (USBR). Under the ratemaking process, in effect prior to the establishment of DOE, the rates and charges for electric power by the then four power administrations were prepared by the individual Administrators subject to confirmation and approval by the FPC. The rates and charges for electric power marketed by the USBR, were subject to final approval of the Secretary of the Interior. In 1977 the Secretary of Energy authorized the Economic Regulatory Administration (ERA) to confirm and approve all Federal power rate adjustments proposed by the five power administrations, and in December 1978 the Secretary of Energy, signed Delegation Order No. 0204-33 which delegated to the Assistant Secretary for Resource Applications the authority to confirm, approve, and place in effect power and transmission rates on an interim basis and delegated to the FERC the authority to confirm and approve such rates on a final basis. The delegation order became effective January 1, 1979. This publication is a compilation of all rate orders issued by the Assistant Secretary for Resource Applications during Calendar Year 1979 under that delegation order. It also includes all final confirmations and approvals by the ERA and the FERC from October 1, 1977, through December 31, 1979. For ready reference, also included are all delegation orders and departmental orders relating to Federal power marketing.

- 5568 (DOE/EP/10004—1) Need for power and the choice of technologies: state decisions on electric power facilities.** (American Bar Association, Washington, DC). Jun 1981. Contract AC01-79RG10004. 221p. NTIS, PC A10/MF A01. Order Number DE81025960.

The findings and recommendations are presented of a study conducted by the American Bar Association's (ABA) Special Committee on Energy Law (SC) to assess decision-making processes at the state level regarding the licensing of electric generating facilities. The basic issues addressed in this report are the need for power and choice of technology; state decisions which directly influence and affect the nation's energy supply, and the tradeoffs involved in meeting energy demand. The areas of special emphasis included the legal mechanisms and regulatory procedures used to determine and resolve these issues. The effectiveness of state decision-making was assessed, focusing on legal and administrative histories and accommodation of interests of concerned parties. Recent innovations to enhance the decision-making process were also assessed where applicable. No particular substantive results are advocated in the findings. The recommendations are broad in scope and include: to the greatest extent feasible, an appropriate state agency should determine the need for power and choice of technology in regular generic proceedings open for public participation; to complement the open planning process, states should require a fair, timely and dispositive certification process to judge the conformity of proposed new facilities with an adopted advance plan; the responsibility for assessing and promoting energy conservation and less traditional sources of power should be vested in the same authority which plans and certifies new facilities; states should continue to experiment with ways to identify and incorporate multi-state, regional, and national concerns in their planning for energy needs and in the construction of new energy facilities; and steps should be taken, e.g., the free flow of information among all participants, to assure basic procedural fairness without losing sight of the goal of reaching and enforcing decisions. (LCL)

5569 (DOE/PE/70278—T16) Financial ability of electric utilities to undertake oil-displacement programs. Hanson, D. (Harvard Univ., Cambridge, MA (USA). Energy and Environmental Policy Center). Apr 1981. Contract AC01-80PE70278. 35p. NTIS, PC A03/MF A01. Order Number DE81025579.

This paper focuses on the conversion (replacement, new capacity, accelerated obsolescence) by utilities from oil and gas to coal and nuclear generating plants. In particular, current regulatory practices are discussed and whether financial barriers inhibit conversion is examined. Policy recommendations consisting of various financial incentives are suggested. It is pointed out that electric utilities use less than 10% of all domestically consumed petroleum and that the potential for a quick significant drop in total oil use is unlikely. There are substantial non-financial barriers inhibiting oil backout programs as well as financial barriers. (DMC)

5570 (DOE/RG/06666—T1) Future powerplant availability: improvement study. Final report. Hartnett, J.P. (Illinois Commerce Commission, Springfield (USA)). 1979. Contract AC01-78RG06666. 228p. NTIS, PC A11/MF A01. Order Number DE81027289.

This project consists of four tasks. The objective of Task I is to document and assess current Illinois Commerce Commission and utility practices concerning reliability planning for future units, and to identify and explain existing incentives and/or disincentives to the attainment of highly reliable new units. The Task II objective is to identify and analyze a number of candidate actions which the Illinois Commerce Commission could implement without a major overhaul of current policies, but which would have a definite, positive effect on the reliability of future generating units. The Task III objective is to develop candidate regulatory policies, procedures, and practices which will promote cost-effective levels of reliability for future generating units. The Task IV objective is to provide information to the extent possible regarding the general range of reliability available for new generating units above 200 MWe and the cost-tradeoffs associated with various levels of reliability. Task IV has as an additional objective to provide information regarding the potential impact of various future unit reliability levels on the State of Illinois in terms of capacity deferral, scarce fuel displacement, ratepayers and utilities. The results of this study indicate that reliability needs to be given great consideration in the certification of new power plants, that working with past performance data standardized, design criteria can be developed which will enhance plant availability, and that there are demonstrable economic incentives for minimizing unanticipated forced outages. (LCL)

5571 (DOE/TIC—1029964) Hydropower sites of the United States developed and undeveloped: river basin maps showing site locations (conventional, pumped storage, retired). (Federal Energy Regulatory Commission, Washington, DC (USA). Office of Electric Power Regulation). Jan 1981. vp. GPO \$127.00. Order Number DE81029964.

The Federal Energy Regulatory Commission, utilizing resources of the Energy Information Administration, including computer and data handling facilities, maintains a comprehensive inventory of hydropower sites in the United States, both developed and undeveloped. The information is used in carrying out the Commission's responsibilities for licensing hydroelectric projects and reviewing project proposals of other Federal agencies. During the past two years, the location code system has been revised and the inventory has been expanded considerably to include smaller undeveloped sites. This publication is its result of compiling and organizing the expanded inventory data in a comprehensive Atlas of hydropower sites. It is the first such Atlas published in the United States. This Atlas identifies the location of about 8100 hydropower sites in the United States by means of a river basin and site coding system for organizing information on the hydroelectric power resources of the County. About 5300 of the sites have been plotted on a series of 85 maps. Retired plant sites are also included. Seventy-nine of these maps covering the conterminous United States are included in the body of this Atlas and six maps covering Alaska, Hawaii, and Puerto Rico are included in attached envelopes.

5572 Movement toward conservation. Douglas, J.; Lechner, M.; Zimmerman, O. *EPRI (Electric Power Research Institute) Journal*; 6: No. 2, 13-17(Mar 1981).

Conservation has three broad interpretations from the utility standpoint: increasing efficiency, load shifting, and substitution. By making the processes in which energy is consumed more efficient, energy supplies will last longer. Shifting electric energy use from peak-demand times (load management) could alleviate some of the nation's dependence on depleting and increasingly expensive fuel sources. National benefits can be reaped if the electric power is produced by resources indigenous to this country. Of the considerations, increasing efficiency and load shifting can be most readily implemented and can achieve results faster. Some technologies could offer benefits in all three areas. A heat pump retrofitted in place of an oil-burning furnace is an electric space-heating system that can be adapted to load shifting, and solar heating and cooling systems for buildings and electric vehicles are also in this category.

The complex energy situations at utilities can be identified as: resource-constrained utilities and capacity-constrained utilities. Specific examples of utilities in the US in these categories and options available and being implemented are described. (MCW)

5573 (MIT-EL—80-022) OESYS: a simulation tool for non-conventional energy applications analysis. Theoretical and operational description with user documentation. Dinwoodie, T.L. (Massachusetts Inst. of Tech., Cambridge (USA)). Aug 1980. Contract AM01-76E102295. 190p. NTIS, PC A09/MF A01. Order Number DE81029701.

A method is developed for assessing both the operational and economic performance of variable mixes of energy conversion technologies within their specific service environments. This method is incorporated into OESYS (Optional Energy Systems Simulator), a computer model with the specific capability to assess conditions of economic viability and service reliability for energy project evaluation. OESYS is especially well suited to handle stochastic (weather-dependent) generation technologies, and will simultaneously handle the generation, transfer, and demand of multiple energy quality levels (electricity, high/low grade thermal, liquid/gaseous fuels, etc.). The model can be applied to most use sectors, including residential, commercial, industrial and institutional, or combinations of use sectors. A model summary description is given on page 13. This paper includes a theoretical description of the types of energy applications handled by OESYS, an operational description of the model, user documentation, and three sample studies.

5574 (MIT-EL-81-011) Integration of decentralized generators with the electric power grid. Finger, S. (Massachusetts Inst. of Tech., Cambridge (USA). Energy Lab.). Apr 1981. Contract AM01-76EI02295. 193p. NTIS, PC A09/MF A01. Order Number DE81029731.

A new methodology is developed for studying the economic interaction of customer-owned electrical generators with the central electric power grid. The purpose of the report is to study the reciprocal effects of the operation and expansion plans of the utility, and the resulting price of electricity, and the demand patterns and expansion plans of customers. The system is modeled in an open-loop feedback mode that allows both the utility and the customers to update their plans and expectations for the next time period based on the other's actions in the current time period and based on any new information such as the current price of oil. The utility and the customers solve similar operation and expansion problems, except that each has control over different variables. In addition, each may have different expectations about the future. A complete methodology encompassing these ideas is developed and implemented.

5575 (NP-22596) Electric-Utility Rate-Design Study: proceedings of the rate-design-study regional conferences. (Resource Planning Associates, Inc., San Francisco, CA (USA)). 21 Oct 1980. 556p. (CONF-8005161-). EPRI, Palo Alto, CA. Order Number DE81901974.

From Rate design study regional conference; San Francisco, CA, USA (May 1980).

The initial paper, Introduction/Framework, to the conferences is presented by Leigh Hammond, North Carolina Utilities Commission. Papers by William Jefferson, Gulf State Utilities Company and Rene Males, Electric Power Research Institute, contain concluding comments. A separate abstract was prepared for each of the other 26 papers. (MCW)

5576 (NP-22596, pp 11-32) Cost and rates. Malko, J.R. (Electric Power and Research Inst., Palo Alto, CA). 21 Oct 1980. EPRI, Palo Alto, CA.

From Rate design study regional conference; San Francisco, CA, USA (May 1980).

Matters concerning costing and rate design for electricity (The Great Rate Debate) are discussed. The impacts of the Debate on these issues are noted. An attempt is made to develop a framework that will define various issues in order to provide information for regulators of utilities to gain some better understanding of complex costs and rate problems. A structure for examining pricing by objectives provided by Dr. James Bonright and the aims of PURPA are discussed. Time-of-use and non-time-of-use pricing, marginal-costing, and accounting costs are discussed. Major findings from the Rate Design Study are noted. It is concluded that alternative accounting and marginal cost methods that have been developed and applied address or satisfy, in varying degrees, alternative-pricing objectives. (MCW)

5577 (NP-22596, pp 33-69) Cost-based rates. Palmer, H. 21 Oct 1980. EPRI, Palo Alto, CA.

From Rate design study regional conference; San Francisco, CA, USA (May 1980).

Time-differentiated accounting costs as a basis for time-of-use rates are discussed. Four methods that allocate energy-related costs in the same way are described. The first demand allocation method is called Probability of Contribution to Peak, developed by Dr. Howard Pifer. The thought there is that all demand costs should be charged to the peak-system demand and doled out in proportion to each customer's contribution to that peak. The EBASCO method is strictly a supply-side method. It tends to break down the demand-related costs of the system into three main categories - base plant, intermediate plant, and peak plant (BIP). The method developed by C.T. Main is a sophistication of the BIP method and is called Fuel Availability Dispatch. In this method, the capacity cost of each unit is distributed over the year in a progressive allocation, first to months, then to days of the month, and finally to hours of the day. The Ernst and Whinney method called Recontracting for Capacity distributes each plant's fixed cost, based on the premise that the utility's customers may bid for or contract for the amount of capacity that they need throughout the year. This concept simulates the conditions that would exist in a free and

competitive market which could set prices, determine output levels, and provide a normal return for equity holders. (MCW)

5578 (NP-22596, pp 71-92) Cost and rates: marginal cost. Tennican, M. 21 Oct 1980. EPRI, Palo Alto, CA.

From Rate design study regional conference; San Francisco, CA, USA (May 1980).

Rate design is discussed with emphasis on time-of-use pricing. Situational factors are described to show their importance in determining whether to use time-differentiated or non-time-differentiated rates. Comments are made on time-differentiated accounting costs that provide perspective for some subsequent comments on time-differentiated marginal-cost methods. Some differences in the available major marginal-costing methodologies are pointed out. The methodologies of Ernst and Whinney; Cicchetti; Gillen, and Snolensky; Gordian Associates; and the National Economic Research Associates are examined. It is concluded that, despite difficulties, both time-differentiated accounting cost and time-differentiated marginal-cost methods are practicable for rate making. (MCW)

5579 (NP-22596, pp 93-115) Cost and rates. Uhler, R.G. 21 Oct 1980. EPRI, Palo Alto, CA.

From Rate design study regional conference; San Francisco, CA, USA (May 1980).

In a discussion on the historical perspective of rate design, the contribution made by Leland Olds, a Commissioner at the Federal Power Commission at the time of President Roosevelt is described. Pricing by objectives is discussed in detail and conservation is deemed most important today. Cost-based rates (customer and utility acceptance, capacity and energy-cost trends, cost-based rated for load controls) are discussed. Costs varying by time of use and alternative-costing methods are discussed. Recommendations made are: that a course of action be chosen; adopt TOD rates selectively; sequentially monitor progress; make cost-benefit calculations prospectively; continually monitor the results of load management; and do the cost-benefit calculations over and over. (MCW)

5580 (NP-22596, pp 117-131) Load research. Fitzpatrick, G.L. 21 Oct 1980. EPRI, Palo Alto, CA.

From Rate design study regional conference; San Francisco, CA, USA (May 1980).

Load-research techniques are presented in a nontechnical way. The reasons load research need be conducted and why load research must be performed are covered. Kinds of costs incurred by all the aspects of a load-research program are described. The transferability of load-research information is discussed, and insights and guidance are offered. (MCW)

5581 (NP-22596, pp 133-146) Load research. Whitney, D. (Los Angeles Dept. of Water and Power, CA). 21 Oct 1980. EPRI, Palo Alto, CA.

From Rate design study regional conference; San Francisco, CA, USA (May 1980).

The traditional load research program at the Los Angeles Dept. of Water and Power, aimed at gathering the cost-of-service data necessary to design rates, is discussed. Then nontraditional load research is discussed, which is the measure of elasticities and customers' responsiveness. The need for additional load research, problems with future load research, and special problems for small utilities are discussed. Slides were used throughout the speech. (MCW)

5582 (NP-22596, pp 147-166) Load research. Abdoo, R.A. (Wisconsin Electric Power Co., Milwaukee). 21 Oct 1980. EPRI, Palo Alto, CA.

From Rate design study regional conference; San Francisco, CA, USA (May 1980).

The experiences with load research at Wisconsin Electric Power Company are reviewed, and a schematic of the program is shown on a slide. Planning, equipment, reliability, commitment, software, and flexibility are presented as parts of a successful load-research program. Emphasis is placed on planning as being the most-important aspect, and this item is discussed at length. Mr. Abdoo's opinion is that load research is a misnomer; that you are actually talking about a massive data collection, correction, and maintenance operation - as witness Wisconsin Electric's 1000 meters installed with 4 data points per hour.

5583 (NP-22596, pp 167-188) **Load research.** Leo, J. (Middle South Services, Inc., New Orleans, LA). 21 Oct 1980. EPRI, Palo Alto, CA.

From Rate design study regional conference; San Francisco, CA, USA (May 1980).

Measures for a successful load-research program are noted. Some important uses for load research are outlined, and a case history of how Middle South Services, Inc. plans to utilize load-research data is given. The requirements established by PURPA are briefly discussed. (MCW)

5584 (NP-22596, pp 189-205) **Equipment for load management.** Schaefer, J. 21 Oct 1980. EPRI, Palo Alto, CA.

From Rate design study regional conference; San Francisco, CA, USA (May 1980).

Equipment used for load management is described. Options feasible for load management pointed out are remote control of loads (water heaters, air conditioners, irrigation pumps, space heaters, etc.); local control of loads (interlocks, clock timing); and time-of-use rates. Equipment needed to implement these options and experiences with the equipment are discussed. Costs of the equipment and evaluation methods for load-management options are detailed. (MCW)

5585 (NP-22596, pp 207-232) **Load control.** Hart, P. (Arizona Public Service Co., Phoenix). 21 Oct 1980. EPRI, Palo Alto, CA.

From Rate design study regional conference; San Francisco, CA, USA (May 1980).

The on-site load-control experiences at Arizona Public Service Company are discussed. Details of a proof of concept test to search for a viable controller more sophisticated than a simple interlock and to determine the results of having the controller function on demand at any time, as opposed to a timing limitation, are described. The proof of concept test continues with time-of-day demand/energy rates, with and without on-site controllers involving about 240 customers. Information developed to date is discussed and some lessons learned are noted. (MCW)

5586 (NP-22596, pp 233-254) **Load control at Detroit Edison.** McIntyre, R.L. (Detroit Edison Co., MI). 21 Oct 1980. EPRI, Palo Alto, CA.

From Rate design study regional conference; San Francisco, CA, USA (May 1980).

Detroit Edison is engaging in many load-management programs. The controlled water-heating program is described in detail. The aim of the program started in 1934, was to minimize the impact of water-heating load on system peaks and to provide water-heating service to customers at the lowest possible price. Control devices considered over the years are mentioned, but radio control was installed. The interaction of the controlled water-heater system with air-conditioning control and the effects of both of these controls on the distribution system are discussed. Brief comments are made on the load-management system hardware presently in use. (MCW)

5587 (NP-22596, pp 255-274) **Load management and controls.** Browne, G.R. (New England Power Service Co., Westborough, MA). 21 Oct 1980. EPRI, Palo Alto, CA.

From Rate design study regional conference; San Francisco, CA, USA (May 1980).

Development of a plan called NEESPLAN at New England Power Service Company is described. The basic objective of NEESPLAN was to limit peak-demand growth to 1.9% with energy growth limited to 2.4% and to reduce reliance of foreign oil from today's 78% to 10% by 1995. One of the more-specific programs is an intensive load-management and conservation program which is addressed in the presentation. The relationship of load control to rate structure is examined. Predictions about load control are made. (MCW)

5588 (NP-22596, pp 275-288) **Customer attitudes.** Kuestler, D.A. (Elrick and Lavidge, Inc., San Francisco, CA). 21 Oct 1980. EPRI, Palo Alto, CA.

From Rate design study regional conference; San Francisco, CA, USA (May 1980).

The importance of customer attitudes and opinions to utilities is discussed. Measurements of attitudes or understandings and acceptance are explained. Then, the author describes several types of customer surveys that Elrick and Lavidge has conducted for the Rate Design Study and for private clients including both investor-owned and public-power utilities. Acceptance of peak-load cycling of central air conditioners is discussed specifically. (MCW)

5589 (NP-22596, pp 289-316) **Time-of-use rate studies with residential customers.** Miedema, A.K. 21 Oct 1980. EPRI, Palo Alto, CA.

From Rate design study regional conference; San Francisco, CA, USA (May 1980).

Research Triangle Institute (RTI) is involved in a North Carolina Rate Demonstration Project and an analysis of time-of-use rates for residential customers for all of the 16 residential-rate-demonstration projects sponsored by DOE. The essential background and objectives of the time-of-use rate-demonstration projects that were undertaken by DOE are described. RTI's role in analyzing data from the projects and the broad results that RTI has developed to date are described. Important factors that may affect the transferability of these results to other service areas are noted. Some critical factors affecting potential future designs of experiments - factors that may warrant consideration in responses to PURPA or in development of utility studies are mentioned. (MCW)

5590 (NP-22596, pp 317-339) **Customer response.** Reynolds, S.P. (Pacific Gas and Electric Co., San Francisco, CA). 21 Oct 1980. EPRI, Palo Alto, CA.

From Rate design study regional conference; San Francisco, CA, USA (May 1980).

Pacific Gas and Electric Company's experience with commercial and industrial time-of-use rates and the elasticity issues associated with those rates are discussed. Specifically, its marginal cost based, time-of-use average cost rate is reviewed. Its objectives and a measurement of the response that has been deduced from the impact of these particular rates are examined. These issues are then related to the Rate Design Study. Slides were used to illustrate the presentation. (MCW)

5591 (NP-22596, pp 341-349) **Load-management evaluation.** Plummer, J. (Electric Power Research Inst., Palo Alto, CA). 21 Oct 1980. EPRI, Palo Alto, CA.

From Rate design study regional conference; San Francisco, CA, USA (May 1980).

Integrative analysis in relationship to PURPA and to rate design or load management is discussed. Its implication to institutional meaning is noted and cost-benefit analysis results of the Rate Design Study are reviewed. The initiation of the Load Management Model project at EPRI, efforts to add demand-side detail (load management options) to existing supply-side optimizing models, and an optimization model for generation expansion (also at EPRI) are explained. (MCW)

5592 (NP-22596, pp 351-366) **Load-management application and evaluation.** Oatman, E. (Electric Power Research Inst., Palo Alto, CA). 21 Oct 1980. EPRI, Palo Alto, CA.

From Rate design study regional conference; San Francisco, CA, USA (May 1980).

The presentation focused on the decision-making process and the role of cost-benefit analysis in developing cost-effective load-management programs. The interface between the customer and the utility is examined. Analytical tools available and some specifics of work performed during the Rate Design Study are discussed. Examples include: a method to evaluate the potential economic benefit of shifting load from on-peak to off-peak; a cost-benefit evaluation based on the use of a large linear-programming model; combinations of load-management options such as cycling of air conditioners, thermal storage with heat pumps, and solar-assisted heat pumps; and the effect of reserve margin and cost to consumers of shifting-peak loads. Insights and guidances of cost-benefit evaluation are examined. (MCW)

5593 (NP-22596, pp 367-393) **Load management.** Whyte, D. 21 Oct 1980. EPRI, Palo Alto, CA.

From Rate design study regional conference; San Francisco, CA, USA (May 1980).

Load management is pointed out as being an integral part of the utility planning process and the specific program at Southern California Edison Company is discussed. Cost-effective calculations at California Edison and an evaluation of the load-management program are described. It is noted that load-management can be used to reduce cost to customers and is utility-specific. (MCW)

5594 (NP-22596, pp 395-414) **Load management.** Buden, L. (Dayton Power and Light Co., OH). 21 Oct 1980. EPRI, Palo Alto, CA.

From Rate design study regional conference; San Francisco, CA, USA (May 1980).

Load management as practiced at The Dayton Power and Light Company is discussed. The initial involvement with load management and the program at the utility are described. The planning and organizing processes necessary and problems encountered in implementation are discussed. The necessity of continuing review of the results of the program and of the environment is emphasized. Many charts are included in the presentation. (MCW)

5595 (NP-22596, pp 415-441) **Load management.** Berry, W.W. (Virginia Electric and Power Co., Richmond). 21 Oct 1980. EPRI, Palo Alto, CA.

From Rate design study regional conference; San Francisco, CA, USA (May 1980).

Virginia Electric and Power Company's approach to load management is reviewed, including its history. The direct load-management program, which involved direct control of electric water heaters, is discussed. Also discussed is the indirect load-management program, which centered on time-of-use rates for large residential customers. Results of an evaluation of the programs were used to develop several different load-management scenarios and to forecast the impact of implementing these scenarios on future growth rates. These modified forecasts for demand and energy were then used to develop future plant requirements. A load-shape model is currently being developed to assist in the forecasting. An evaluation of net cost and benefits of large-scale implementation is in progress to complete the cycle and the final step is to proceed to the regulatory review. (MCW)

5596 (NP-22596, pp 443-452) **Load-management evaluation.** Bryson, J.E. (California Public Utilities Commission, San Francisco). 21 Oct 1980. EPRI, Palo Alto, CA.

From Rate design study regional conference; San Francisco, CA, USA (May 1980).

Load management as viewed in California encompasses marginal-cost rate design, load cycling and other interruptible service, and a wide variety of utility- and customer-initiated conservation programs. These are summarized from a regulatory point of view. Time-of-use rates, load control and cycling equipment, marginal cost methodology, electric rate structure reform, and load management through conservation are discussed. (MCW)

5597 (NP-22596, pp 453-470) **Load management.** Fischer, R.F. (Michigan Public Service Commission, Lansing). 21 Oct 1980. EPRI, Palo Alto, CA.

From Rate design study regional conference; San Francisco, CA, USA (May 1980).

A review of electric utility load management programs is presented and the potential for incorporation of load control concepts into utility operating philosophy is explored. Additional discussion follows on what should and should not be done and how to do it. Specifically discussed are supply-management and load-management efforts in Michigan and purposes of load management. (MCW)

5598 (NP-22596, pp 471-498) **Load management.** Zielinski, C.A. (New York State Public Service Commission, Albany). 21 Oct 1980. EPRI, Palo Alto, CA.

From Rate design study regional conference; San Francisco, CA, USA (May 1980).

A brief description of load management as defined in New York is given. Regulatory goals are discussed which include three elements: setting just and equitable rates; seeking safe, reliable, and more environmentally benign utility service; and stimulating a utility to keep the total costs of service that must be incurred as low as

reasonably possible. PURPA's goals are discussed. The New York approach to load management and the limits of load management are discussed. (MCW)

5599 (NP-22596, pp 499-519) **Long-term outlook for the electric-power business.** Corey, G.R. 21 Oct 1980. EPRI, Palo Alto, CA.

From Rate design study regional conference; San Francisco, CA, USA (May 1980).

The financial problems of the US electric-power industry are detailed and the causes of these problems are said to be inflation, outmoded rate regulation, a sense of frustration, and a widespread inclination of people in the public forum to denigrate the industry. Four suggestions are made for dealing with the problems and their causes, namely: find ways to modify original-cost regulation so that it will work in an inflationary environment; maintain flexibility to accept new ideas; be able to mitigate the kind of needless regulation that restricts management options; and acting with reason. A fifth point—one for which the author proposes no solution—involves the attacks on middle management who have acted usually to the best of their ability with ever-changing health and safety regulations, but who are subsequently condemned. The risk of destroying all business initiative is present.

5600 (NP-22596, pp 533-540) **Regulation and the electric-utility industry.** Swidler, J.C. 21 Oct 1980. EPRI, Palo Alto, CA.

From Rate design study regional conference; San Francisco, CA, USA (May 1980).

Contrast between present electric-utility conditions and the time when there were few rate cases (money was cheap and utilities were considered a prime investment) is made. Presently, most companies are on the edge of debt coverage, and stock dilution has proceeded so far as to warn of the possible early demise of the market for equities; increased rates are engulfed rapidly by inflation. Company deferrals and cancellations of new base-load capacity are taken for a combination of reasons, but there is great concern that at the end of the decade the country will be short of base-load capacity, especially nuclear and coal, and in desperation, utilities will be compelled to use oil-burning combustion turbines. Complexities of the utility regulatory system in the US are discussed. It is pointed out that PURPA is an example of the elaboration of the workings of federalism in an area of dual jurisdiction, where the states have traditionally exercised responsibility; although, because of the interstate nature of the electric power industry the Federal Government could, if it wished, take over some or perhaps all of the state functions. The legislation requires consideration by state regulators of various problems of national concern, without prescribing the results they must reach. (MCW)

5601 (NYSERDA-80-15-Vol.1) **Monitoring and control requirement definition study for dispersed storage and generation (DSG).** Final report, Volume I. (General Electric Co., Schenectady, NY (USA)). Oct 1980. 318p. New York State Energy Research and Development Authority, Albany.

Dispersed Storage and Generation (DSG) is the term that characterizes the present and future dispersed, relatively small (< 30 MW) energy systems, such as solar thermal electric, photovoltaic, wind, fuel cell, storage battery, hydro, and cogeneration, that can help achieve national energy conservation goals and can be dispersed throughout the distribution portion of an electric utility system. A study of trends reveals that the need for DSG monitoring and control equipment by 1990 to 2000 will be great. Criteria for assessing DSG integration have been defined and indicate that economic and institutional as well as technical and other factors must be included. The functional requirements for DSG monitoring and control in six major categories are emphasized here. Twenty-four functional requirements have been prepared under these six categories and serve to indicate how to integrate the DSGs with the distribution and other portions of the electric utility system. The results indicate that there are no fundamental technical obstacles to prevent the connection of dispersed storage and generation to the distribution system. However, a communication system of some sophistication will be required to integrate the distribution system and the dispersed generation sources for effective control. The large-size span of generators from 10 kW to 30 MW means that a variety of remote monitoring and control may be required. An increased

effort is required to develop demonstration equipment to perform the DSG monitoring and control functions and to acquire experience with this equipment in the utility distribution environment.

5602 (NYSERDA—80-15-Vol.3) Monitoring and control requirement definition study for dispersed storage generation (DSG). Volume III. Appendix B. (General Electric Co., Schenectady, NY (USA)). Oct 1980. 43p. New York State Energy Research and Development Authority, Albany.

A major aim of the US National Energy Policy, as well as that of the New York State Energy Research and Development Authority, is to conserve energy and to shift from oil to more abundant domestic fuels and renewable energy sources. Dispersed Storage and Generation (DSG) is the term that characterizes the present and future dispersed, relatively small (< 30 MW) energy systems, such as solar thermal electric, photovoltaic, wind, fuel cell, storage battery, hydro, and cogeneration, which can help achieve these national energy goals and can be dispersed throughout the distribution portion of an electric utility system. This document identifies the present status, trends, potential growth for selected DSGs, and implications on DSG monitoring and control. Based on current projections, it appears that DSG electrical energy will comprise only a small portion, from 4 to 10%, of the national total by the end of this century. In general, the growth potential for DSG seems favorable in the long term because of finite fossil energy resources and increasing fuel prices. Recent trends, especially in the institutional and regulatory fields, have favored greater use of DSGs for the future. This study has assimilated the considered estimates and opinions of others, for the DSG markets and the DSG's ability to serve them. So far as possible a cross section of various sources has been included in composite projections.

5603 (PB—81-117244) Analysis barriers to improving the hydroelectric power interface with electric power systems. Final report. (Resource Analysis, Inc., Waltham, MA (USA)). 30 Sep 1980. Contract DI-14-34-0001-9625. 95p. NTIS, PC A05/MF A01.

The analysis barriers to improving the interface of hydroelectric power with electric power systems are investigated and discussed. The value of hydropower to society and the utilities is explored touching on the problems of weather and hydrological dependencies, multiple-use conflicts and engineering aspects. Special attention is afforded to the organizational structure of the electric utility industry and the operational and planning functions as they relate to hydroelectric power production. Analytical approaches taken to optimize the use of hydropower over time are surveyed. Current barriers to these approaches are presented along with future research topics which potentially may alleviate them.

5604 (PB—81-119778) Electric generation expansion analysis system. A progress report on Pri 1529. (Massachusetts Inst. of Tech., Cambridge (USA). Energy Lab.). Jun 1980. 217p. NTIS, PC A10/MF A01.

The Electric Generation Expansion Analysis System (EGEAS) is planned to provide a state-of-the-art flexible software system for electric utility capacity expansion planning which will utilize a common data base and control program for both a set of core analysis alternatives and a set of modular, advanced feature packages. The system will be based upon selected existing operating and capacity expansion software as well as upon software developed during the length of the contract. EGEAS is based upon two currently available but independent optimization packages GEM (linear programming) developed at MIT and OPTGEN (dynamic programming) developed by Stone and Webster Engineering Corp. In addition, EGEAS will utilize the operating system model SYSGEN developed at MIT. The complete EGEAS structure will incorporate a third optimization algorithm, Generalized Benders' decomposition, and two other analysis options, Year-End Optimization and Prespecified Expansion Pathway as portions of the overall system giving five analysis options. The data structure of the MIT GEM model will be expanded and evolved to be accessed by all five analysis options.

5605 Energy efficiency and the utilities: new directions. Westly, S. (ed.). San Francisco, CA; California Public Utilities Commission (1980). 203p. (CONF-8004162—).

From Symposium on energy efficiency and the utilities: new directions; Stanford, CA, USA (18 Apr 1980).

The central inquiry of this symposium was what role the nation's utilities should play to encourage, and provide incentives for, energy conservation and efficiency. Five specific areas were selected as discussion topics: 1) the Utility Role in Solar; 2) the Utility Role in Conservation; 3) Load Management and Conservation Rate Design; 4) Cogeneration and Small Power Production; and, 5) New Directions for Utility Resource and Financial Planning. There was a panel (with moderator) of 3 to 5 members for each area, with a speaker introducing each session and a panel discussion following; also, there was a luncheon speaker each day: Dr. Daniel Yergin, co-editor of the Harvard Energy Study, *Energy Future*, on April 18; and Mr. Amory Lovins, British Representative, Friends of the Earth, on April 12. The purpose of the symposium was to provide a forum for knowledgeable and influential people from a variety of backgrounds bearing on national energy policy to exchange ideas. To this end, the CPUC invited leaders from the financial community, the utility industry, state regulatory commissions, other federal state, and local governmental bodies, the academic and research communities, public interest groups, and the media. A thoughtful and provocative dialogue resulted thus this edited publication of the proceedings was arranged to reach a wider audience.

5606 Ratemaking: the problem now is the art. Bower, R.S. pp 26-38 of Proceedings of the 1980 rate symposium on problems of regulated industries. Columbia, MO; University of Missouri (1980).

From 1980 rate symposium on problems of regulated industries; Kansas City, MO, USA (10 Feb 1980).

Ratemaking as a science and an art are discussed in this article. A case study in electrical ratemaking involving distribution of revenues among classes and the development of rate structures for each class is presented. Data are included for: class cost of service; marginal running cost; marginal cost study-demand related costs; and revenue vs cost by class. (DMC)

5607 Locally-owned utilities see margins plummet; but revenues up appreciably. Utroska, D. *Electric Light and Power*; 59: No. 7, 13-14, 16(Jul 1981).

High revenues, up 22.8%, contrast with the low net income of the 50 largest locally-owned utilities in 1980. Net utility plant increased 15.4% and sales 5.4% during the year. Financing for new generating plants is uncertain for power cooperatives because of budget cuts for the Rural Electrification Administration and the Federal Finance Bank. Statistics from the top 50 are presented in four tables comparing rank and summarizing financial data for public power organizations, distribution cooperatives, and generation and transmission cooperatives. (DCK)

5608 Garbage-to-electricity. Part 1. Success elusive in garbage power. Snook, R.W. *Electric Light and Power*; 59: No. 7, 25-26, 28(Jul 1981).

Only the two smallest of the ten large-scale projects to convert municipal trash into electric power are operating, while the others are either shut down for a variety of reasons or not yet operating. Utilities with an interest in refuse derived fuel (RDF) tend to prefer boilers which burn 100% RDF rather than having a supplemental capability. No common cause is found to relate the failures to type of utility ownership. The Environmental Protection Agency is backing away from the concept after funding some of the earlier projects. Some support could come under the Energy Security Act, but DOE has not taken an active role. Utility interest in the technology continues, but new facilities will feature boilers designed for trash. Low-grade process-steam generation has been more successful to date than power generation, according to a recent survey of 42 waste-to-energy projects. The two-part article will continue with more operating information on the 10 utility projects. 2 tables. (DCK)

5609 Detroit Edison reveals coal-evaluation technique: reaps plant savings. *Electric Light and Power*; 59: No. 7, 33-34(Jul 1981).

A probability technique for analyzing coal to balance the quality of various coals for boiler fuel saved the Detroit Edison Company's customers over \$11 million in 1980. The Net Fired Fuel

Cost Simulator uses a Monte Carlo simulation to correlate the characteristics of different coals and project the costs of burning a given coal. Submodels of the pollution control/precipitator, coal pulverizing, boiler, and non-fuel systems simulate power plant performance, while a fifth submodel projects system generation costs. Cost estimations of five reference coals identified a high quality washed coal as a best buy and a low quality raw coal as the most costly for both the long and short term. 4 figures, 4 tables. (DCK)

5610 More power, less pollution. Katzenstein, A.W. *Electric Perspectives*; 21-24(Spr 1981).

The electric power industry has compiled a four-decade record of unprecedented growth and change during which electricity raised the standard of living and emissions decreased. A review of the post-Depression development tells how the industry balanced the needs of economic development and environmental concern of a growing population. Continued research and planning should result in further improvements in combustion technology, in fuel desulfurization, and in the ability to control and reduce emissions.

5611 Order-delivery lag in electricity investment. Lioukas, S.K. (London Graduate School of Business Studies, England). *Applied Economics*; 13: No. 1, 35-49(Mar 1981).

This study uses 1947-1976 data from the United Kingdom electric-generating industry to estimate the structure of the lag between investment decisions and realizations and has broken it down into a stable and a variable component. A variable for capital-expenditure slippage was used in the breakdown in two ways: first, the weights of the realization schedule were expressed as a function of the cumulative slippage experienced in the first stages of construction; second, the realization level itself was expressed as a function of past investments and slippages. The second model performed better; empirical tests showed consistent and clear-cut results. The same model was also found superior to alternative models employing the backlog of uncompleted projects or a simple time-trend in the break-down lags. The results obtained indicate that the average lags anticipated are shorter than the average lags actually experienced. This suggests that for planning purposes this industry adopts difficult targets relative to actual construction times. In essence, this is the reason for the success of the slippage variable in extracting the variable component of the lag. 15 references, 4 figures.

5612 Demand control: a cost-effective approach. Spielvogel, L.G. *Electrical World*; 195: No. 3, 101-103(Mar 1981).

This is the second and final part of a series on how to use electric rate schedules when considering energy-saving measures. The first part looked at how rate schedules should be analyzed. This section looks at the various demand-control techniques that can be used, and suggests that demand analysis has not been as thorough as it should have been. It also suggests consideration of an incremental cost/benefit approach.

5613 Public-utility participation in decentralized power production. Gentry, B.S. *Harvard Environmental Law Review*; 5: No. 2, 297-344(1981).

This article explores the implications of a program of federal incentives designed to increase utility participation in decentralized power production. In doing so, issues relating to competition, deregulation, and the design of effective federal incentives are discussed. The article is divided into four sections. The first describes the current state of the electric industry and the benefits that can be derived from greater use of decentralized power production. The second presents the current federal program for promoting decentralized power production and the reasons it cannot be expected to maximize the use of decentralized sources. The potential advantages and disadvantages of greater utility efforts in decentralized power production are discussed in the third section, along with the proper role of competition in the generation of electricity. In the final section, a new approach to encouraging the use of decentralized sources is developed and used to evaluate several recent proposals for increasing utility investment in decentralized generating facilities.

5614 Power and the environment: a case study of the siting of 765-kilovolt transmission line. Burststein, K. (New York Public Service Commission, Albany). pp 111-130 of *Environment, energy, public policy: toward a rational future*. Axelrod, R.S. (ed.). Lexington, MA; D.C. Heath and Company (1981).

From Conference on energy and environment; Garden City, NY, USA (8 Jun 1979).

In 1973, the Power Authority of the State of New York filed an application to construct a 765-kV transmission line to bring Canadian-produced hydroelectric power to New York City. The New York State Public Service Commission, (PSC) held hearings on this case, which was concluded in 1978. This paper discusses the case and the PSC decisions. 60 references. (DLC)

5615 Efficiency measurement in the regulated sector: an empirical study of the Massachusetts electric utility industry employing the Williamson expense-preference theory in a pooled regression model. Lawler, W.C. Amherst, MA; Univ. of Massachusetts (1981). 176p. University Microfilms Order No. 81-10,339.

Thesis (Ph. D.).

This thesis develops a prototype model for estimating the efficiency of management in the regulated sector. The analysis proceeds in two stages. The first stage deals with the lack of an operational definition for top-management efficiency in the regulated sector. Although this subject has been extensively developed in the economic literature, it is shown that this generally accepted definition of efficiency is not applicable to the problem at hand due to the lack of concern for control. To be a valid measure of efficiency, top-management control must be demonstrated and, thus, a somewhat radical definition of efficiency espoused by Oliver Williamson [1964, 1970] is operationalized. This definition emphasizes control and focuses on expense-preference items - those incurred not for their contribution to production but rather for the manner in which they enhance personal goals. The relationship of these items - size of staff, emoluments and discretionary profits - to the cost per kilowatt output is then used to measure efficiency. The final stage involves the construction of a methodology for comparative analysis among utilities which controls for the diverse characteristics of these utilities. Since the nature of the industry dictates a small sample size when attempting any comparative analysis, such diverse factors as vertical integration, generation mix, market type, size and variability of demand have historically invalidated research findings. By employing a pooled regression model developed and extended by Zellner [1966] and Swamy [1970], this problem is overcome.

5616 Capability of US to meet demand causes concern. Weslowski, J. *Electrical Review International*; 207: No. 17, 60, 65(7 Nov 1980).

Peak demand for electricity rose 6.2% to 425 537 MW in the US this summer. With this growth in mind, the National Electric Reliability Council has concluded that major generation and transmission projects in the US must stop being hindered or the country could face extended capacity and reliability problems in the late 1980s.

5617 Peak load pricing lowers generation costs. Lande, R.H. *Electrical Review International*; 207: No. 17, 66-67(7 Nov 1980).

Before a utility implements peak load pricing for different classes of consumers the costs and the benefits should be compared. The methodology described enables a utility to determine whether peak load pricing should be introduced for specific users.

5618 Electricity demand forecasting: realism at last. Crabbe, D.; Lowe, B. (Open Univ., Milton Keynes, England). *Electrical Review (London)*; 206: No. 18, 12-13(30 May 1980).

Recently revised forecasts of future electricity demand by the Electricity Council seem to have passed comparatively unnoticed by most commentators and consequently have not claimed as much attention as they deserve. These forecasts clearly reflect a radical departure in official thinking on prospects for demand for electricity in the short and medium-term future and, as such, merit more than cursory consideration.

5619 **International financing by electric utilities.** Hildreth, R.G. Jr.; Seligson, C.H. (Merrill Lynch White Weld, New York, NY). *Electric Perspectives*; 27-31(Win 1980).

Capital from foreign investors is available to US electric utilities and offers, at present, the advantage of more-favorable terms. Even at comparable terms, foreign capital offers a broader and more diversified capital base, which can add options, diminish financial risk, and give utilities a stronger negotiating posture. A further advantage is the ability to move quickly in rapidly changing markets. Two Euro-bond issues were offered in the last five years by a US utility. (DCK)

5620 **Public utility regulation and the decade ahead.** Perry, H. pp 99-105 of Proceedings of the 1980 rate symposium on problems of regulated industries. Columbia, MO; University of Missouri (1980).

From 1980 rate symposium on problems of regulated industries; Kansas City, MO, USA (10 Feb 1980).

The DOE is committed to strengthening the states rates in regulating public utilities. Since utilities are both major suppliers and consumers of energy, they constitute a unique sector of the energy economy and pose special opportunities and problems for public policy. Public energy policy for the 80's is discussed in regard to utility regulation. (DMC)

5621 **Electricity pricing and national energy policy.** Uhler, R.G. pp 122-130 of Proceedings of the 1980 rate symposium on problems of regulated industries. Columbia, MO; University of Missouri (1980).

From 1980 rate symposium on problems of regulated industries; Kansas City, MO, USA (10 Feb 1980).

This paper examines the relationship between electricity pricing and national energy policy. Emphasizing the importance of achieving national objectives of conservation and efficiency, the research findings of four prestigious studies are reported. The policy recommendation of these groups that energy pricing should reflect marginal costs is contrasted with the recent decision of the Ontario Energy Board.

5622 **Progress with PURPA: the activities of Pacific Gas and Electric Company in meeting the requirements of Section 133 of the Public Utility Regulatory Policies Act of 1978.** Reynolds, S.P. pp 184-199 of Proceedings of the 1980 rate symposium on problems of regulated industries. Columbia, MO; University of Missouri (1980).

From 1980 rate symposium on problems of regulated industries; Kansas City, MO, USA (10 Feb 1980).

The purpose of this article is to discuss how a utility can comply with the procedural aspects of Section 133 of the Public Utility Regulatory Policy Act (PURPA) and still meet the analytic and policy goals set forth by Congress. The progress of Pacific Gas and Electric (PG & E) in complying with federal and state requirements is described. Also discussed are some of the activities PG & E has undertaken in innovative rate design and marginal costing that are conceptually related to Section 133. Examples of the use of Section 133 data are demonstrated in a variety of cases ranging from Avoided Cost computations to the evaluation of the cost-effectiveness of conservation and load management programs. Section 133 requires utilities to produce cost-of-service data in order to improve the state-of-the-art of ratemaking and advance current retail rate design. (DMC)

5623 **Rural electrification and fertility change in the southern Philippines.** Herrin, A.N. *Population and Development Review*; 5: No. 1, 61-86(Mar 1979).

This article presents a detailed preliminary investigation of this hypothesis. It describes current socioeconomic and demographic change in the study area and explores likely relationships between rural electrification and fertility. Electric power has been an important catalyst in generating social and economic changes at both community and household levels. (PSB)

2980 Consumption And Utilization

REFER ALSO TO CITATION(S) 5280, 5329, 5450

5624 (DOE/EIA/10085-T1(Pt.1)) **National Interim Energy-Consumption Survey. Part I. Household and utility-company surveys.** (Response Analysis Corp., Princeton, NJ (USA)). 30 Jun 1981. Contract AC01-79E110085. 78p. (DOE/EIA-0295/1). NTIS, PC A05/MF A01. Order Number DE81026311.

The methodology for the National Interim Energy Consumption Survey (NIECS), an integrated set of data collections, data files, and analyses which bring together surveys of households and of utility companies and fuel dealers who serve them, is presented in six separate parts. Surveys of rental agents provide supplemental information and a transportation panel provides information on miles traveled and fuel consumption of household vehicles. A total of 4081 questionnaires were completed, including 3842 personal face-to-face interviews and 239 mailed questionnaires. Information on sampling and estimating procedures, conducting the household and utility company data collection, data preparation and editing, and imputations and adjustments for missing data is presented in Part I. Specific information was asked on end uses of fuels consumed by the households, energy conservation activities, household vehicles, and characteristics of the housing unit and its residents. A chronology and guide to the report are given in Part I. (MCW)

5625 (DOE/EIA/10085-T1(Pt.2)) **National Interim Energy-Consumption Survey. Part II. Household and utility-company surveys. Appendix A. (Response Analysis Corp., Princeton, NJ (USA)).** 1981. Contract AC01-79E110085. 304p. (DOE/EIA-0295/2). NTIS, PC A14/MF A01. Order Number DE81026310.

Appendix A of the National Interim Energy Consumption Survey (methodology) an integrated set of data collections, data files, and analyses which bring together surveys of households and of the utility companies and fuel dealers who serve them, is presented. Forty-four items (letters, records, instructions, questionnaires, etc.) concerned with the survey are included and are categorized into these areas: household survey materials; household survey reassignment materials; interview verification materials; authorization form followup; mailed questionnaire materials; survey of fuel oil and LPG companies; survey of electric and utility gas companies; rental agent survey; and full oil survey. (MCW)

5626 (DOE/EIA/10085-T1(Pt.3)) **National Interim Energy-Consumption Survey. Part III. Household and utility-company surveys. Appendices B through G. (Response Analysis Corp., Princeton, NJ (USA)).** 1981. Contract AC01-79E110085. 158p. (DOE/EIA-0295/3). NTIS, PC A08/MF A01. Order Number DE81026080.

Six appendices to the National Interim Energy Consumption Survey (methodology), an integrated set of data collections, data files, and analyses which bring together surveys of households and of utility companies and fuel dealers who serve them, are presented. Data files prepared for household and fuel consumption data; editing and coding instructions for household questionnaire; computer editing specifications for personal interview questionnaire; editing and coding instructions and forms for fuel consumption data; regression procedures for fuel consumption imputations; and imputations for item nonresponse in household questionnaire are presented. (MCW)

5627 (DOE/EIA/10085-T1(Pt.4)) **National Interim Energy-Consumption Survey. Part IV. Transportation panel. Including Appendices A through C. (Response Analysis Corp., Princeton, NJ (USA)).** 1981. Contract AC01-79E110085. 135p. (DOE/EIA-0295/4). NTIS, PC A07/MF A01. Order Number DE81026079.

The activities of the transportation panel, a monthly survey in which a national sample of households are asked to keep a record of all fuel purchased for vehicles used by the household, are summarized. The fuels of interest are gasoline, diesel fuel, and gasohol. Eligible vehicles include automobiles, station wagons, passen-

ger and cargo vans, motor homes, pickups and other small trucks, and jeeps. A pretest was conducted April and May 1979 to determine the extent to which households respondents were willing to keep records of their gasoline purchases and to provide guidance on the best ways to request these data. Activities of this period are described. The activities of the transportation panel from June to October 1979, are summarized. Appendices A, B, and C is: transportation panel presented in Appendices A, B, and C is: transportation panel design (issues and comments); data collection materials; data files, coding instructions, and forms. (MCW)

5628 (DOE/EIA/10085-T1(Pt.5)) National Interim Energy-Consumption Survey. Part V. Transportation panel. Appendices D through H. (Response Analysis Corp., Princeton, NJ (USA)). 1981. Contract AC01-79E110085. 194p. (DOE/EIA-0295/5). NTIS, PC A09/MF A01. Order Number DE81027604.

Five appendices to a report on the activities of the transportation panel, a monthly survey in which a national sample of households are asked to keep a record of all fuel purchased for vehicles used by the households, are presented. Gasoline, diesel fuels, and gasoline for automobiles, station wagons, passenger and cargo vans, motor homes, pickup and other small trucks, and jeeps are of interest. The following are presented: an outline of the operating environment of the IBM/3033 computer and the programming strategy that was used for development of the transportation panel; an outline of each transportation panel program; specific EDIT enhancements for the transportation panel; the TPEDIT 1 and TPEDIT 2 driving tables, TPVCODES and TPRELATE with explanation and translation; and a description of the editing checks using vehicle miles per gallon with examples. Vehicle completeness and data imputation are discussed. (MCW)

5629 (DOE/EIA/10085-T1(Pt.6)) National Interim Energy-Consumption Survey. Part VI. Energy assessment. (Response Analysis Corp., Princeton, NJ (USA)). 1981. Contract AC01-79E110085. 251p. (DOE/EIA-0295/6). NTIS, PC A12/MF A01. Order Number DE81027605.

The goal of energy assessment of the housing unit is to obtain physical information which can be combined with other survey results to give a more complete picture of the residential environment. A limited pretest of an energy assessment procedure was carried out in April-June 1979 with a subsample of 44 households that had been originally interviewed in the National Interim Energy Consumption Survey. In order to gain experience under a variety of environmental conditions, the pretest sites included locations in the Northeast, North Central, and South regions. As developed for the pretest, the energy assessment was a 90-minute inspection of the housing unit by a trained technician. Data collected during the inspection included square footage of the unit; age, make, and characteristics of appliances; insulation characteristics, characteristics of siting and apertures; and detailed information on the heating and cooling systems in the unit. The report describes the data collection procedures for the pretest.

5630 (PB-81-800369) Fuel consumption: industrial, residential, and general studies. 1977-October 1980 (citations from the NTIS data base). Report for 1977-October 1980. Hundemann, A.S. (National Technical Information Service, Springfield, VA (USA)). Nov 1980. 176p. NTIS PC N01/MF N01.

Citations of research on fuel supply, demand, shortages, and conservation through effective utilization are presented. A few abstracts pertain to energy consumption in the agricultural sector, fuel substitution, economic studies, and environmental concerns relating to energy consumption. Bibliographies on electric power consumption and fuel consumption by transportation also are available. (This updated bibliography contains 140 citations, 10 of which are new entries to the previous edition.)

5631 (SERI/TP-721-1316) Electric coheating experiment to determine the heat-loss coefficient of a double-envelope house. Oregon, J.K.E.; Anderson, J.V.; Connolly, J.M.; Bingham, C.E. (Solar Energy Research Inst., Golden, CO (USA)). Jul 1981. Contract AC02-77CH00178. 7p. (CONF-810925-11). NTIS, PC A02/MF A01. Order Number DE81027937.

From 6. national passive conference; Portland, OR, USA (8 Sep 1981).

An electric coheating experiment was conducted on a double-envelope house in Arvada, Colorado, to determine the total heat loss coefficient (UA) of the double-shelled structure, as well as the heat loss coefficients of the inner and outer shells. Electric coheating is fairly well established as an experimental method for determining the total heat loss coefficient in conventional residential buildings. However, special problems are introduced with passive and double-envelope buildings. A new methodology was developed to meet these problems. That methodology and the results of the experimental investigation are presented and discussed.

5632 (SERI/TR-721-1119) Appliance efficiency and the solar building. Swisher, J. (Solar Energy Research Inst., Golden, CO (USA)). Jun 1981. Contract AC02-77CH00178. 30p. NTIS, PC A03/MF A01. Order Number DE81029073.

This report examines energy use in residential appliances. Current appliance energy use is evaluated and technologically feasible improvements are studied. A typical set of household appliances is developed, and modified by three classes of efficiency improvements. Significant energy saving potential is found in all major appliance energy uses, with the largest savings in water heaters and refrigerators. Costs of the improvements are relatively low, providing short payback times. The effects of the improvements on building thermal loads and electricity demand profiles are also examined.

5633 (SERI/TR-733-79OR(Vol.1)) Energy end-use requirements in manufacturing. Limaye, D.R.; Isser, S.; Beatty, R.; Colville, G.; Lang, K.; Krawiec, F. (Solar Energy Research Inst., Golden, CO (USA)). Jul 1981. Contract AC02-77CH00178. 233p. NTIS, PC A11/MF A01. Order Number DE81028975.

This three volume report examines energy end-use requirements and cost employed to characterize typical applications and resultant services in the US and state manufacturing subsectors in 1977 and 1990. A review and evaluation of existing industrial energy data bases were undertaken to assess their potential for supporting SERI research to analyze technical and economic feasibility of solar technologies, and to establish multiyear R & D programs for: (1) solar thermal industrial electric power systems and (2) solar IPH systems. In the review of existing industrial energy data bases, the level of detail, disaggregation, and primary sources of information were examined. The focus was on fuels and electric energy used for heat and power purchased by the manufacturing subsector and listed by 2-, 3-, and 4-digit SIC, primary fuel, and end use. Projections of state level energy prices to 1990 were developed and presented by using the energy intensity approach. The effects of federal and state industrial energy conservation programs on future industrial sector demands were assessed. Current (1977) and future (1990) energy end-use requirements in manufacturing were developed for each 4-digit SIC industry and were grouped as follows: (1) hot water; (2) steam (212° to 300°F, each 100°F interval from 300° to 1000°F, and greater than 100°F), and (3) hot air (100°F intervals). Volume I details the activities performed in this effort.

5634 (SERI/TR-733-79OR(Vol.2)) Energy end-use requirements in manufacturing. Limaye, D.R.; Isser, S.; Beatty, R.; Colville, G.; Lang, K.; Krawiec, F.; (Solar Energy Research Inst., Golden, CO (USA)). Jul 1981. Contract AC02-77CH00178. 624p. NTIS, PC A99/MF A01. Order Number DE81027973.

Volume II presents data on the US and state manufacturing subsectors' energy end-use requirements disaggregated by 2- and 4-digit SIC and temperature level in 1977.

5635 (SERI/TR-733-79OR(Vol.3)) Energy end-use requirements in manufacturing. Krawiec, F.; Limaye, D.R.; Isser, S.; Beatty, R.; Colville, G.; Krawiec, F.; Lang, K. (Solar Energy Research Inst., Golden, CO (USA)). Jul 1981. Contract AC02-77CH00178. 624p. NTIS, PC A99/MF A01. Order Number DE81027976.

Volume III presents data on the US and state manufacturing subsectors' energy end-use requirements disaggregated by 2- and 4-digit SIC and temperature level in 1990.

5636 Domestic energy consumption in India (Pondicherry region). Gupta, C.L.; Rao, K.U.; Vasudevaraju, V.A. (Tata Energy Research Inst., Pondicherry, India). *Energy (Oxford)*; 5: No. 12, 1213-1222 (Dec 1980).

Surveys were conducted in 200 households in and around Pondicherry, in 45 households of each of two rural and two semi-urban areas, and in 20 households in an urban area. The families surveyed cover the Economically Weaker Section, the Low Income Group, the Middle Income Group, and the High Income Group; there were 60 families in each of the first three categories in rural and semi-rural areas and 20 of the fourth category in the urban area. The objective of this empirical study was to determine the daily household energy consumption for cooking, lighting, heating water, and for household electrical appliances. The average energy content of the commercial and noncommercial fuels used for cooking, heating water, and lighting has been determined on a per capita daily basis. The seasonal and hourly variations were also determined for cooking and lighting loads. 9 refs.

2990 Unconventional Sources And Power Generation

REFER ALSO TO CITATION(S) 5291, 5321, 5330, 5363, 5423, 5453, 5483, 5486, 5489, 5573, 5608, 5613, 5632

5637 (ANL/CONSV-TM-73) Development of a case study for the Cinnaminson landfill methane recovery operation. Schirra, G.W.; Sharp, T.E.; Nielson, D.C. (Argonne National Lab., IL (USA)). Feb 1981. Contract W-31-109-ENG-38. 67p. NTIS, PC A04/MF A01. Order Number DE81029988.

The development, construction, and operation of a methane recovery plant in Cinnaminson, New Jersey, on the site of a sanitary landfill are described in this report. The project was undertaken in 2 phases. At the end of the 1st phase, 250,000 ft³/day of gas (heating value of 600 Btu/ft³) was being produced by the facility and consumed by a nearby industry. At the end of phase II, 600,000 ft³/day was being produced (heating value of 561 Btu/ft³). (DMC)

5638 (ANL/EES-TM-149) Near-term goals for alcohol fuels from biomass: an overview of resource requirements, land use, environmental, and socioeconomic impacts. Halsey, J.; Hazard, D.; Kawaoka, K.; Stephens, K.; D'Alessio, G. (Argonne National Lab., IL (USA)). Dec 1980. Contract W-31-109-ENG-38. 111p. NTIS, PC A06/MF A01. Order Number DE81029987.

On January 11, 1980, the President set a target for domestic alcohol fuel production capability of 500 million gallons per year by 1981. Current domestic production capability is about 120 million gallons per year. If the entire amount of 1981 alcohol fuel (all ethanol) was blended to make gasoline, gasoline would account for almost 10 percent of the anticipated 1981 national demand for unleaded gasoline. A 30-percent displacement of gasoline by gasoline blended with ethanol would require an ethanol production capacity of 3 billion gallons per year, or about 1.2 billion bushels of corn. (About 7.6 billion bushels of corn were produced in the United States in 1979). This report examines the biomass resources needed to meet national alcohol production goals, reviews available technologies for utilizing agricultural products and byproducts, and identifies potential environmental and socioeconomic impacts of near-term alcohol production. The analysis places particular emphasis on near-term (1985 to 1986) land resource requirements and impacts, with particular attention to the major corn producing states. In addition, a number of other studies are discussed that deal with the long-term resource requirements of a National Alcohol Fuels Program. The results of this analysis indicates that: (1) The grain availability for ethanol production does not appear to be limiting for these near-term production capacity goals; (2) Conversely, major expansion of acreage planted in corn should not result from these goals; (3) Environmental impacts on and from farm lands should not increase significantly due to the near-term goals; (4) Food prices may increase in the mid-1980s to late 1980s due to the near-term goals, but farmers should benefit overall; and (5) The expansion of alcohol production in the longer term (1986 to 2000 and beyond) will necessitate the use of additional biomass feedstocks and residues.

5639 (CONF-810802-2) Information resources in the USA on new and renewable energy: a description and directory. (Department of Energy, Oak Ridge, TN (USA). Technical Information Center). 1 Jun 1981. 81p. NTIS, PC A05/MF A01. Order Number DE81028867.

From Conference on new and renewable energy sources; Nairobi, Kenya (Aug 1981).

This report is a contribution of the United States of America to preparations for the 1981 United Nations Conference on New and Renewable Sources of Energy. It describes the production dissemination, and availability of US scientific and technical information about new and renewable energy resources, the policy framework within which the technologies are developed, and the roles of public and private sectors. It also contains a directory of sources of additional information - printed material, computerized data bases, institutional services, and personal contacts - about the use of new and renewable energy. This report was prepared through the assistance of the Department of Energy's Technical Information Center, with funding and guidance from the Department of Energy and advice from an Interagency Task Force led by the Department of State. Inquiries about its contents should be addressed to the US Department of Energy, Technical Information Center, P.O. Box 62, Oak Ridge, TN 37830.

5640 (CONF-810832-5) Passive cooling and heating program at Oak Ridge National Laboratory for FY-1981. Shapira, H.B.; Kaplan, S.I.; Chester, C.V. (Oak Ridge National Lab., TN (USA)). 1981. Contract W-7405-ENG-26. 11p. NTIS, PC A02/MF A01. Order Number DE81028573.

From DOE passive and hybrid solar energy program update; Washington, DC, USA (9 Aug 1981).

Construction was completed of an earth-sheltered, passively solar heated office-dormitory, the Joint Institute for Heavy Ion Research, designed at ORNL. Instrumentation of the building was designed, procured, and installed. Building performance will be monitored and compared with predictions of the DOE-2 code. A study of the incorporation of vegetation on architecture was conducted by the Harvard School of Design. A final report was issued which is a prototype handbook for the use of vegetation to reduce cooling loads in structures. An experiment to reduce the cooling requirement of mobile homes by shading with fast-growing vines was begun: a maintenance-oriented trellis was constructed and vines were planted. An RFP for the production of a prototype set of reflective insulating blinds was issued.

5641 (DOE/CS/30278-T5) Solar Technology Assessment Project. Volume IV. Solar air conditioning: active, hybrid and passive. (Florida Technological Univ., Cape Canaveral (USA). FL Solar Energy Center; Arizona State Univ., Tempe (USA). Coll. of Architecture). Apr 1981. Contract FC02-79CS30278. 58p. NTIS, PC A04/MF A01. Order Number DE81029005.

The status of absorption cycle solar air conditioning and the Rankine cycle solar cooling system is reviewed. Vapor jet ejector chillers, solar pond based cooling, and photovoltaic compression air conditioning are also briefly discussed. Hybrid solar cooling by direct and indirect evaporative cooling, and dehumidification by desiccation are described and discussed. Passive solar cooling by convective and radiative processes, evaporative cooling by passive processes, and cooling with roof ponds and movable insulation are reviewed. Federal and state involvement in solar cooling is discussed. (LEW)

5642 (DOE/CS/30278-T6) Solar Technology Assessment Project. Volume VII. A review of OTEC. Yuen, P.C. (Florida Solar Energy Center, Cape Canaveral (USA); Hawaii Univ., Honolulu (USA). Hawaii Natural Energy Inst.). Apr 1981. Contract FC02-79CS30278. 150p. NTIS, PC A07/MF A01. Order Number DE81029008.

The Ocean Thermal Energy Conversion (OTEC) principle is discussed along with general system and cycle types, specific OTEC designs, applications, and the ocean thermal resource. The historic development and present status of OTEC are reviewed. Power system components of the more technically advanced closed-cycle OTEC concept are discussed: heat exchangers, corrosion and biofouling countermeasures, working fluids, ammonia

power systems, and on-platform seawater systems. Several open-cycle features are also discussed. A critical review of the ocean engineering aspects of the OTEC power system is presented. Major subsystems such as platform, cold water pipe, mooring system, dynamic positioning system and power transmission cable system are assessed for their relationships with the ocean environment and with each other. Nine available studies of OTEC costs are reviewed, and tentative comparisons are made between OTEC and traditional fuel costs. OTEC products and markets are considered. Possible environmental and social effects of OTEC development are discussed. International and national laws regulating OTEC plants are reviewed, specifically, the United Nations Third Conference on the Law of the Sea and the Ocean Thermal Energy Conversion Act of 1980. Coast Guard regulations, OSHA laws, and state and local government regulations are also considered as well as attitudes of the utilities. (LEW)

5643 (DOE/CS/30278—T7) Solar Technology Assessment Project. Volume V. Solar industrial process heat. (Florida Technological Univ., Cape Canaveral (USA). FL Solar Energy Center; Tennessee Univ., Knoxville (USA). Energy, Environment and Resources Center). Apr 1981. Contract FC02-79CS30278. 82p. NTIS, PC A05/MF A01. Order Number DE81029006.

The Solar Industrial Process Heat (SIPH) assessment is done to candidly examine the contribution SIPH is realistically able to make in the near and long-term energy futures of the United States. The performance history of government and privately funded SIPH demonstration projects and the present status of SIPH technology are discussed. Before making final recommendations, the influence of economic and socio-political factors (which have a very large effect on the acceptability and application of any new, alternate energy technology) are considered also. Focus is on evacuated tube, parabolic trough, and multiple reflector solar collectors. Auxiliary equipment which is part of a SIPH system such as pumps, blowers, controls, and heat exchangers and storage (where applicable) are discussed also.

5644 (DOE/CS/30278—T8) Solar Technology Assessment Project. Volume XI. The solar industry in the United States: its status and prospects, 1981. Clark, J.A. (Florida Solar Energy Center, Cape Canaveral (USA); Michigan Univ., Ann Arbor (USA). Dept. of Mechanical Engineering). Apr 1981. Contract FC02-79CS30278. 47p. NTIS, PC A03/MF A01. Order Number DE81029030.

The energy production goals for the solar industry, and the industry's present status are described. Manufacturing and sales of low and medium temperature solar collectors from 1974 to 2000 are analyzed, and the HUD/DOE solar demonstration programs' relative merits are discussed. Certain characteristics of the conventional water heating industry are briefly described and compared with the solar water heating industry. Module and system cost data for the photovoltaics industry are summarized. Codes, standards, testing certification, labelling and warranties are discussed, and the government's role is defined. (LEW)

5645 (DOE/CS/30278—T9) Solar Technology Assessment Project. Volume VI. Photovoltaic technology assessment. (Florida Technological Univ., Cape Canaveral (USA). FL Solar Energy Center; Arizona State Univ., Tempe (USA). Coll. of Architecture). Apr 1981. Contract FC02-79CS30278. 41p. NTIS, PC A03/MF A01. Order Number DE81029007.

Industrial production of photovoltaic systems and volume of sales are reviewed. Low cost silicon production techniques are reviewed, including the Czochralski process, heat exchange method, edge defined film fed growth, dendritic web growth, and silicon on ceramic process. Semiconducting silicon, amorphous silicon, and low cost poly-silicon are discussed as well as advanced materials and concentrator systems. Balance of system components beyond those needed to manufacture the solar panels are included. Non-technical factors are assessed. The 1986 system cost goals are briefly reviewed. (LEW)

5646 (DOE/CS/30278—T11) Solar Technology Assessment Project. Volume X. Solar technology assessment; biomass. Sheppard, A.P.; Birchfield, J.L.; Spurlock, J.M. (Florida Solar Energy Center, Cape Canaveral (USA); Georgia Inst. of Tech., Atlanta (USA)). Apr 1981. Contract FC02-79CS30278. 59p. NTIS, PC A04/MF A01. Order Number DE81029011.

The technical status of various biomass fuels, and needed national action and research are summarized. Fuels discussed include biomass liquid fuels from agricultural feedstocks (alcohol), liquid fuels from cellulosic feedstocks, energy from wood, and non-woody biomass converted to gaseous fuels. (LEW)

5647 (DOE/CS/30278—T12) Solar Technology Assessment Project. Volume III. Active space heating and hot water supply with solar energy. Karaki, S.; Loeff, G.O.G. (Florida Technological Univ., Cape Canaveral (USA). FL Solar Energy Center; Colorado State Univ., Fort Collins (USA). Solar Energy Applications Lab.). Apr 1981. Contract FC02-79CS30278. 35p. NTIS, PC A03/MF A01. Order Number DE81029004.

Several types of solar water heaters are described and assessed. These include thermosiphon water heaters and pump circulation water heaters. Auxiliary water heating is briefly discussed, and new and retrofit systems are compared. Liquid-based space heating systems and solar air heaters are described and assessed, auxiliary space heating are discussed, and new and retrofit solar space heating systems are compared. The status of flat-plate collectors, evacuated tube collectors, and thermal storage systems is examined. Systems improvements, reliability, durability and maintenance are discussed. The economic assessment of space and water heating systems includes a comparison of new systems costs with conventional fuels, and sales history and projections. The variety of participants in the solar industry and users of solar heat is discussed, and various incentives and barriers to solar heating are examined. Several policy implications are discussed, and specific government actions are recommended. (LEW)

5648 (DOE/CS/30278—T13) Solar Technology Assessment Project. Volume IX. Helioast systems: technical and economic assessment. Hildebrandt, A.F.; Laurence, C.L. (Florida Solar Energy Center, Cape Canaveral (USA); Houston Univ., TX (USA). Energy Lab.). Apr 1981. Contract FC02-79CS30278. 92p. NTIS, PC A05/MF A01. Order Number DE81029010.

An extensive review of the literature is provided on helioast central receiver systems including subsystem design and research experiments, full scale system designs, assessments, evaluations, rankings, application and marketing studies, and helioast manufacturing studies. The current status of helioast system development is reviewed and assessed. Recent design reports are examined, and expected economic and performance improvements are reported. Recommendations are made for the role that government can play in helioast systems development, and for state and federal policies for development of solar commercialization and the formation of heating utilities. (LEW)

5649 (DOE/CS/30278—T14) Solar Technology Assessment Project. Volume XII. State and community commercialization issues. Doctor, R.D.; Hamrin, J. (Florida Solar Energy Center, Cape Canaveral (USA); Western Sun, Portland, OR (USA); Alliance for Renewable Energy, Sacramento, CA (USA)). Apr 1981. Contract FC02-79CS30278. 57p. NTIS, PC A04/MF A01. Order Number DE81029087.

The need to overcome economic and institutional barriers and make the transition to using renewable energy sources is briefly explained, and advantages to implementation of solar technology on the state and local government levels are discussed. The role of government involvement is defined, and the gathering and dissemination of information are discussed. Consumer protection programs are divided into 3 parts: problem prevention and detection; reliability assurance; and redress for problems. Each of these parts is discussed. Mandates, economic incentives, and subsidies are described and analyzed. (LEW)

5650 (DOE/CS/30278—T16) Solar Technology Assessment Project. Volume II. Passive solar technology. (Florida Technological Univ., Cape Canaveral (USA), FL Solar Energy Center; Yale Univ., New Haven, CT (USA)). Apr 1981. Contract FC02-79CS30278. 61p. NTIS, PC A04/MF A01. Order Number DE81029003.

The status of passive solar heating and cooling for residential, commercial, and agricultural applications, and of daylighting is summarized. Passive solar energy is used in the broad sense describing a comprehensive approach to design that considers all climatic impacts on a building, and includes planning on the multi-building scale. The key roles of the designer and of innovation in the building industry are discussed. Numerous terms are defined and the origins of several are discussed. Passive design principles are summarized. Performance and costs of passive solar technologies are examined. Passive energy design tools and methods are considered in the context of the overall process by which building decisions are made to achieve the integration of new techniques into conventional design. (LEW)

5651 Direct energy conversion: an attractive option for developing countries. Sharma, D. K. (Univ of Benin, Niger). *Energy (Oxford)*; 5: No. 12, 1257-1259 (Dec 1980).

Solar energy will play a key role in direct energy conversion. The conversion efficiency of a variety of silicon and GaAs solar cells are described. A cost comparison of silicon and GaAs hybrid solar systems shows current average costs of 4.4¢/cent and 6.75¢/cent per kWh in the U.S.A. and 11¢/cent per kWh in Nigeria. A brief account of current developments and future prospects is given for integrated tandem solar cells (ITSC) and for electrochemical solar cells. 19 refs.

5652 Evaluation of solar water heating and solar active cooling in New Mexico. Final report. Lumsdaine, E.; Cherrig, J.G. Santa Fe, NM; New Mexico Energy and Minerals Dept. (1981). 161p. (NP—81903394; EMD—2-65-2214).

The discussion of on-site performance of solar hot water systems covers the field study of the solar hot water systems located at Socorro High School, Socorro, New Mexico, and Springer High School, Springer, New Mexico. The design merits of the two solar systems are presented, as well as the principles of operation, instrumentation and data acquisition, and operation, repairs, and maintenance. The assessment study of solar active cooling systems concentrates on five solar active cooling systems: absorption (ammonia-water, water-LiBr), Rankine cycle vapor compression, desiccant dehumidification, vapor ejector cooling, and solar-assisted heat pump. It discusses the basic operation principles, the thermal performance characteristics, and the related technical and nontechnical aspects of the systems. Finally, a recommendation is made on the priority of solar active cooling systems for future research and development programs in New Mexico.

5653 (DOE/ET/23133—T2) Harvesting of close-spaced short-rotation woody biomass. Cullen, D.E.; Barr, W.J. (Mathtech, Inc., Princeton, NJ (USA)). 15 Jun 1980. Contract AC01-78ET23133. 101p. NTIS, PC A06/MF A01. Order Number DE81027314.

The objective of this project is to investigate alternative strategies and techniques of harvesting which appear to be commercially viable for use on closely spaced short-rotation biomass farms where coppicing will be used. Efforts to date have been concerned with identifying the characteristics of prospective woody biomass farms. Appendix I contains a summary of requirements for harvested wood used as feedstock for various conversion processes. The characteristics of harvesting, collecting, transporting, and storing equipment as used by the forest products and agricultural industries are described in this report. The applicability of the foregoing equipment to close-spaced, short-rotation biomass farms is discussed. The harvesting operation associated with supplying a single large wood conversion plant has been modelled to achieve the lowest cost system. (DMC)

5654 (DOE/ET/27194—T4) Geothermal policy development program: expediting the local geothermal permitting process. (GRIPS Commission, Santa Rosa, CA (USA)). Jul 1981. Contract FC03-79ET27194. 216p. NTIS, PC A10/MF A01. Order Number DE81026878.

For a number of years, concerns have been raised about the length of time and the complexity involved in obtaining required permits in order to develop the geothermal resource at the Geysers. Perhaps the most important factor is jurisdiction. At the Geysers, all three levels of government - local, state, and federal - exercise significant authority over various aspects of geothermal development. In addition, several agencies within each governmental level play an active role in the permitting process. The present study is concerned primarily with the local permitting process, and the ways in which this process could be expedited. This report begins by looking at the local role in the overall permitting process, and then reviews the findings and conclusions that have been reached in other studies of the problem. This is followed by a case study evaluation of recent permitting experience in the four Geysers-Calistoga KGRA counties, and the report concludes by outlining several approaches to expediting the local permitting process.

5655 (DOE/ET/29372—1) Concepts for design of an energy-management system incorporating dispersed storage and generation. Kirkham, H.; Koerner, T.; Nightingale, D. (Jet Propulsion Lab., Pasadena, CA (USA)). 15 Apr 1981. Contract A101-79ET29372. 131p. NTIS, PC A07/MF A01. Order Number DE81028371.

New forms of generation based on renewable resources must be managed as part of existing power systems in order to be utilized with maximum effectiveness. Many of these generators are by their very nature dispersed or small, so that they will be connected to the distribution part of the power system. This situation poses new questions of control and protection, and the intermittent nature of some of the energy sources poses problems of scheduling and dispatch. This report assumes that the general objectives of energy management will remain unchanged and discusses the impact of dispersed storage and generation on some of the specific functions of power system control, and its hardware.

5656 (DOE/SF/01952—T1) Solar-wood stove domestic heating systems. Final report. Morghen, K.; Solomon, B.; Sussman, A.J.; Carter, J.; Conrat, R. (Sierra Nevada Coll., Incline Village (USA); Sussman (Arthur J.), Point Arena, CA (USA); Mill Creek Energy Sunworks, Healdsburg, CA (USA)). Dec 1980. Contract FG03-78SF01952; FG03-78SF01933; FG03-79SF10553; FG03-79SF10564. 72p. NTIS, PC A04/MF A01. Order Number DE81027822.

Sierra Nevada College developed and tested a residential/commercial wood-stove system as a back-up to a solar active system. The wood-stove was designed to produce both hot water and hot air. The original stove design was modified during testing in order to improve system performance. In particular, a preheater was added, and the stove was modified to supply hot water from a coil around the chimney and hot air from a jacket around the combustion chamber. Its use as a back-up system for solar was compared with a conventional gas system. The results indicated no appreciable cost differences between the two back-up systems, although gas required less labor and maintenance. Another grant was awarded to design, construct and test a stovepipe water heater with bypass section as a complement to a solar water heater. The first prototype did not meet the demand for adequate hot water production due to excessive creosote accumulation on the coils, which reduced hot water production. The second prototype utilized firebox heat exchangers and regulated the amount of hot water by means of a movable shield. This prototype still did not produce as much hot water as desired. A third prototype was developed which incorporated a flue control. This final prototype provided satisfactory hot water production and excellent regulation of output. The last grant was awarded to Mill Creek Energy Sunworks to install and monitor four different configurations of solar-woodstove domestic heating systems, to develop optimized system design parameters and to determine the cost-effectiveness of this approach to domestic water heating.

5657 (DOE/SF/10601-0) Economic assessment of advanced central-receiver solar-thermal power systems. Executive summary. (Westinghouse Electric Corp., East Pittsburgh, PA (USA). Advanced Systems Technology Div.). Oct 1980. Contract AC03-79SF10601. 23p. NTIS, PC A02/MF A01.

The value and potential electric utility impact of several advanced central receiver solar-thermal plant concepts in the role of electric generating stations are estimated. The impacts of interest included economics, the cost of producing electricity, fuels displaced, and utility system reliability. The central receiver plants evaluated included solar/fossil hybrid concepts and solar stand-alone plants with thermal storage. Liquid metal/molten salt, closed Brayton cycle, improved water-steam, and combined Brayton/Rankine cycle concepts were among those investigated. Detailed modeling of the operation of these plants, as they would operate on several electric utility systems, was the primary analytical method used. Because of the uncertainty of many assumptions, sensitivity analysis was used extensively. Analysis to optimize collector area and storage capacity was also performed. The study indicates that if the DOE cost goals can be achieved and projected solar plant performance attained, then the advanced solar-thermal concepts can be competitive in regions with good insolation and some continued use of oil or other surrogate distillate or gaseous fuels. Some thermal storage (3 to 6 hours) was also found to be desirable for most applications.

5658 (DOE/SF/10854-T1) Measurement of attitudes toward commercial development of geothermal energy in Federal Region IX. Final report. (Market Facts, Inc., Arlington, VA (USA)). Jun 1981. Contract AC03-80SF10854. 559p. NTIS, PC A24/MF A01. Order Number DE81028442.

A survey was conducted of ten target study groups and subgroups for Klamath Falls, Oregon, and Susanville, California: local government, current and potential industry at the site, relocators to the site, current and potential financial community, regulators, and current and potential promoters and developers. The results of benchmark attitudinal measurement is presented separately for each target group. A literature review was conducted and Macro-environmental attitudes of a sample of local government and industry personnel at the sites were assessed. An assessment of capabilities was made which involved two measurements. The first was a measurement of a sample of promoters, developers, and industrial service companies active at the site to determine infrastructure capabilities required by industry for geothermal plants. The second measurement involved analyzing a sample of industry management in the area and defining their requirements for plant retrofit and expansion. Finally, the processes used by the study group to analyze information to reach commitment and regulatory decisions that significantly impact on geothermal energy projects at the site were identified and defined.

5659 (EPRI-EA-1957) Supply problems in the solar heating and cooling industry. Final report. (DHR, Inc., Washington, DC (USA)). Aug 1981. 33p. NTIS, PC A03/MF A01. Order Number DE81903739.

Future distribution channels and costs in the solar-heating-and-cooling industry are discussed and some of the external factors influencing the industry are examined such as public policy initiatives and competing technologies. The distribution channels through which solar equipment passes from manufacturer to consumer are examined; future industry evolution will most likely be towards a multiplicity of distribution networks, each serving a different market segment. The components of solar costs, including collector, other system components, indirect and marketing, and installation and O & M costs, are also reviewed. Costs for high quality solar collectors are projected to increase, however the rate of increase is uncertain. Solar costs could increase at: (a) construction industry cost escalation rates; (b) general economic inflation rates; or (c) below the general inflation rate. Nevertheless, the average price paid by consumers is expected to increase at slightly less than the rate of inflation because lower-quality, low-priced systems are expected to garner a larger share of future solar sales. Pertinent public policy initiatives are reviewed which may critically influence the development of solar energy, and the impact of competing energy sources on solar heating economics is considered. Consider-

ation of the projections for the aforementioned supply characteristics suggests that product supply may have a significant constraining influence on the growth of the solar industry.

5660 (LA-8889-MS) Attached-sunspace passive solar-heated residences: a study of nationwide patterns of economic feasibility for the existing housing stock. Roach, F., Kirschner, C. (Los Alamos National Lab., NM (USA)). Jun 1981. Contract W-7405-ENG-36. 135p. NTIS, PC A07/MF A01. Order Number DE81026309.

Performance estimates for attached-sunspace passive solar-heated residences recently have been incorporated into the Los Alamos/UNM EASE III Model. These estimates are used to analyze the economic performance of a passive sunspace design when retrofitting onto an existing single-family home. Several key parameters are evaluated, including loan or mortgage terms, ownership period, resale potential, and competing conventional fuel prices. General economic and design parameters are combined in one version of life-cycle costing to evaluate the feasibility of both owner-built and contractor-built attached sunspaces for 220 regions in the contiguous US. The conventional fuel alternatives are natural gas, heating oil, electric resistance, and electric heat pump. The optimal sunspace design is determined for the fuel alternatives by minimizing the combined solar and conventional delivered cost of heat. An analysis of fuel used for space heating in existing homes is used to discuss the retrofit potential for the 220 regions. Results show that the prospect for conventional fuel displacement through retrofit of attached sunspace is very good, and that the design's economic performance is enhanced in regions with expensive conventional fuel alternatives.

5661 (LA-UR-81-2200) Passive-solar-retrofit study for the United States Navy. Wray, W.O.; Miles, C.R. (Los Alamos National Lab., NM (USA); Civil Engineering Lab. (Navy), Port Hueneme, CA (USA)). 1981. Contract W-7405-ENG-36. 6p. (CONF-810925-7). NTIS, PC A02/MF A01. Order Number DE81028921.

From 6. national passive conference; Portland, OR, USA (8 Sep 1981).

A passive solar retrofit study has been conducted for the United States Navy at the Los Alamos National Laboratory. The purpose of the study was to determine the energy savings obtainable in concrete block buildings from several passive solar heating strategies. A procedure involving the use of test cell data and computer simulation was employed to assess the merits of six retrofit options. The six strategies selected were chosen on the basis of providing a series of options that will deliver increasing energy savings at the cost of correspondingly increased levels of commitment.

5662 (LBL-12752) Systems simulation and economic analysis for active solar cooling. Warren, M.; Wahlig, M. (Lawrence Berkeley Lab., CA (USA)). Jul 1981. Contract W-7405-ENG-48. 3p. (CONF-810912-12). NTIS, PC A02/MF A01. Order Number DE81028015.

From Active contractors' review meeting; Washington, DC, USA (Sep 1981).

A consistent methodology has been developed by which general solar cooling market capture goals have been translated into specific cost and performance goals for solar cooling systems and subsystems. Preliminary results indicate that realistic cost/performance goals can be established for active solar cooling systems and that, with aggressive development, these goals can be reached by the year 2000. As the technology develops, tax incentives will be required to bridge the gap between the actual costs and the cost goals, so that the scenario of an ever increasing share of market penetration can be maintained over the 1986 to 2000 time period.

5663 (MASEC-CF-81-038) Seminars for private college administrators on solar applications for college buildings. (Mid-American Solar Energy Complex, Minneapolis, MN (USA)). Jun 1981. Contract AC02-79CS30150. 8p. NTIS, PC A02/MF A01. Order Number DE81027981.

The objective of this project was to increase the working knowledge of key private college decision makers on passive and active solar fundamentals, proven passive and active technology, and conservation means integral to these technologies in the ren-

ovation of college buildings or their energy systems, to be achieved by conducting a series of three seminars. A summary of the project activities and a brief summary of workshop evaluations are given. (MCW)

5664 (ORAU—181B) Individual biomass facility reports supplement to some employment and earnings implications of regional biomass energy utilization: New England and the cornbelt states. (Oak Ridge Associated Universities, Inc., TN (USA)). Aug 1981. Contract AC05-76OR00033. 155p. NTIS, PC A08/MF A01. Order Number DE81028523.

Research was conducted to determine the direct employment and earnings implications of regional biomass energy utilization. This document provides details of the primary data collected during the course of the investigation. A case studies approach was used to observe and analyze various biomass energy systems. Visits were made to existing biomass facilities and data on their operation and employment requirements were collected. Information on planned or potential future facilities was also obtained. When this information was analyzed, a fairly accurate picture of the current situation as well as the rate and direction of future development in biomass can be attained. Separate descriptions are included for each facility visited or for each interview obtained. The facility reports are organized according to fuel cycle (wood-fuel, alcohol-fuel, municipal solid waste facilities, others). (DMC)

5665 (SAND—80-8049, pp 155-156) Issues concerning heliostats commercialization. Brandt, L.D. (Sandia National Labs., Livermore, CA). Jan 1981. NTIS, PC A12/MF A01. From Solar central receiver semi-annual meeting; San Francisco, CA, USA (15 Oct 1980).

Major sources of information for the commercialization study were discussions with potential heliostats suppliers and previously completed heliostat production cost studies. Heliostat suppliers indicated that the major tasks to be accomplished during commercialization are: (1) expansion of production rates to exploit economies of scale, (2) development of effective manufacturing processes, and (3) continued design evolution to make heliostats more producible. Over the commercialization period, the cost of heliostats is expected to decline and the processing experience necessary for high-level mass production will be acquired. Programs supported in part by government funding will provide the only significant demands for heliostats in the near term.

5666 (SAND—81-1490C) Sandia program in geothermal technology development. Kelsey, J.R.; Caskey, B.C. (Sandia National Labs., Albuquerque, NM (USA)). 1981. Contract AC04-76DP00789. 4p. (CONF-811015-4). NTIS, PC A02/MF A01. Order Number DE81025394.

From Geothermal Resources Council annual meeting; Houston, TX, USA (25 Oct 1981).

The objective of the Department of Energy (DOE) sponsored program in geothermal research and development (R and D) has shifted from demonstrating technologies for well cost reduction to long range R and D aimed at developing advanced technologies. This paper presents the accomplishments of the program, the status of current projects, and plans for future activities. The program includes R and D in high temperature rock penetration mechanics, drilling fluids borehole mechanics, and diagnostics technology.

5667 (SERI/CP—633-1145, pp 125-129) Market potential for high temperature process heat. Iannucci, J.J.; Melius, C.F. (Sandia National Labs., Livermore, CA). Apr 1981. NTIS, PC A08/MF A01.

In Solar thermal energy systems research and advanced development program review.

To provide a complementary perspective on the US industrial process heat market, an analysis is done on the types of process heat currently used. All process heat (even at a given temperature) is not equally easy to replace with solar energy. A breakdown of the process heat market by detailed type (steam, direct heat, indirect heat, etc.) is presented.

5668 (SERI/CP—633-1145, pp 139-144) Regional assessment of solar thermal energy. Witholder, R.E. Jr. (Solar Energy Research Inst., Golden, CO). Apr 1981. NTIS, PC A08/MF A01.

In Solar thermal energy systems research and advanced development program review.

The breakeven value and cost of solar thermal electric systems in the South Central, North Central, and Northwest regions of the United States are tabulated. The optimum situation is seen in the South Central Region. The other regions appear to have applications potential beyond the year 2000. The methods of value analysis for centralized and distributed systems are shown. (LEW)

5669 (SERI/TP—721-1300) Comparison of residential window distributions and effects of mass and insulation. Hannan, M.; Christensen, C.; Perkins, R. (Solar Energy Research Inst., Golden, CO (USA)). Jul 1981. Contract AC02-77CH00178. 7p. (CONF-810925-9). NTIS, PC A02/MF A01. Order Number DE81027938.

From 6. national passive conference; Portland, OR, USA (8 Sep 1981).

The energy requirements and comfort implications of various window distributions and window areas (representing conventional, sun-tempered, and passive solar designs) are investigated for single-family residences in Albuquerque, NM, Denver, CO, and Madison, WI. Three distinct mass levels ranging from lightweight to heavyweight interiors and three distinct insulation levels, including energy-conserving, night-insulated, and superinsulated cases, are analyzed. Energy requirements are reported for residences with electric resistance heating and mechanical air conditioning. Comfort conditions reported are based on interior average air temperatures and mean-squared errors.

5670 (SERI/TP—721-1325) Performance analysis of 11 Denver Metro passive homes. Claridge, D.E.; Simms, D.A. (Solar Energy Research Inst., Golden, CO (USA)). Jul 1981. Contract AC02-77CH00178. 7p. (CONF-810925-12). NTIS, PC A02/MF A01. Order Number DE81025473.

From 6. national passive conference; Portland, OR, USA (8 Sep 1981).

The Solar Energy Research Institute (SERI) sponsored the Denver Metro Solar Homebuilders Program in cooperation with the Department of Energy and Western SUN. The auxiliary heating requirements for 11 of the passive solar homes were calculated using SLR or SUNCAT-2.4 with a standard set of basic assumptions. The analysis shows that seven of the homes should use less than half as much heating fuel as typical houses recently built in the area; two should use about half; and two should use about two-thirds or more. Comparing these results with performance estimates provided by design consultants shows numerous large discrepancies. These differences can be attributed largely to specific differences in assumptions in every case but one.

5671 (SERI/TP—721-1326) Comparative study of four building energy simulations: Phase II; DOE-2.1, BLAST-3.0, SUNCAT-2.4, and DEROB-4. Judkoff, R.; Wortman, D.; O'Doherty, B. (Solar Energy Research Inst., Golden, CO (USA)). Jul 1981. Contract AC02-77CH00178. 6p. (CONF-810925-14). NTIS, PC A02/MF A01. Order Number DE81025472.

From 6. national passive conference; Portland, OR, USA (8 Sep 1981).

Four building energy analysis codes are compared using two direct gain building models with Madison, WI, and Albuquerque, NM, typical meteorological year (TMY) data. Annual heating and cooling loads are compared and analyzed with respect to two previous studies. The results from all four codes disagree significantly.

5672 (SERI/TR—762-966) Wind power for developing nations. Mikhail, A. (Solar Energy Research Inst., Golden, CO (USA)). Jul 1981. Contract AC02-77CH00178. 33p. NTIS, PC A15/MF A01. Order Number DE81025792.

This report is designed to assist engineers, energy planners in developing countries, and donor agencies' personnel to assess the global potential of wind energy conversion systems (WECS). The cost effectiveness of WECS mainly depends on the availability of the wind resource, system power performance, and the comparative cost of alternate energy sources. Therefore, this report presents an overview of the global wind resource including observed zonal wind systems for each continent, available wind data, current wind maps, and on-going studies to assess the global wind potential.

Also, because the most accurate method of assessing wind energy potential in a certain location is on-site measurement, the differences between commercially available wind sensors and recording equipments are discussed. A methodology is outlined for obtaining a match between machine and site characteristics for most cost-effective power production. The first three sections deal primarily with wind resource and wind-machine interaction. The final two sections cover wind machine technology and wind energy applications.

5673 (SOLAR/1046-81/50) Solar project description for living systems single family residence, Davis, California. (Department of Housing and Urban Development, Washington, DC (USA); Boeing Co., Seattle, WA (USA)). 31 Aug 1981. Contract AB01-76CS31020. 75p. NTIS, PC A04/MF A01. Order Number DE81029743.

Two independent systems are described - a direct gain passive solar space heating system and an active domestic hot water preheating system. Large south-facing windows and a clerestory skylight permit direct winter sun to enter the house. Solar energy thermal storage is provided by both water filled tubes and the concrete slab floor. Movable shutters and insulating curtains provide capability to reduce night heat losses. Summer overheat protection is provided by roof overhangs and by natural ventilation. A natural gas furnace and wood stove provide auxiliary space heat. The domestic hot water system has an array of liquid flat plate collector with a gross area of 53 square feet. Freeze protection is by drain-down. An 82-gallon solar preheat tank supplies water to a conventional 20-gallon domestic hot water tank. The collector, storage, heating load, and auxiliary loads subsystems and modes of operation are described for both systems. The house is instrumented for thermal performance evaluation. Original cost estimates for provision and installation of the solar system are given. (LEW)

5674 (WSUN-75) Oregon Solar Business Directory. (Western Solar Utilization Network, Portland, OR (USA); Oregon Solar Energy Industries Association, Portland (USA)). Apr 1981. Contract AC02-79CS30159. 36p. NTIS, PC A03/MF A01. Order Number DE81027700.

A current guide to renewable energy services and products available in Oregon is presented. A section on consumer buying tips is included to assist in planning the purchase and install installation of equipment. Also included is a list of information centers that carry publications about renewable energy technologies. (LEW)

5675 Extraction timing and economic incentives for geothermal reservoir management. Golabi, K. (Woodward-Clyde Consultants, San Francisco, CA); Scherer, C.R. Contract E476-S-03-0034PA248. *Journal of Environmental Economics and Management*; 8: No. 2, 156-174 (Jun 1981).

This article considers the best extraction program for a hot-water geothermal reservoir with emphasis on the optimal time to begin extraction. Using a production function relating the rate of extraction to the quality of produced energy, an operational model is presented that gives the best time to begin production, the optimal pumping rate, and the best planning horizon. Also investigated is the effect of economic parameters and incentives on these decision variables. This paper studies some means by which regulatory agencies can influence the timing and rate of exploitation of geothermal energy by manipulating economic incentives, and provides information for both public and private decision making in the management of this resource. 11 references, 3 figures, 2 tables.

5676 Application of I.R.C. Section 617 to geothermal exploratory costs. Stoney, C.J. Jr.; Pesiri, E.G. (Petty, Andrews, Tufts & Jackson, San Francisco, CA). *Oil and Gas Tax Quarterly*; 29: No. 4, 671-684 (Jun 1981).

This article: (1) traces the pertinent legislative history of Section 617 prior to the Energy Tax Act of 1978; (2) reviews and analyzes the judicial tax treatment of geothermal resources; (3) reviews and analyzes the provisions and legislative history of the Energy Tax Act of 1978; and (4) concludes that the judicial and legislative tax treatment of geothermal resources provide substantial authority that geothermal exploratory costs are deductible under Section 617. 35 references.

5677 Photovoltaics: matching policy to technology. Brown, M.; Kendall, R. (Arizona Public Service Co., Phoenix). *Electric Perspectives*; 1-11 (Spr 1981).

Photovoltaics could become economically viable in grid-connected applications within the current 10-year electric utility planning time, although an understanding of the technology and cost factors is needed before policies can be developed. All solar-cell suppliers do not agree that demonstration programs aimed at reducing current prices will meet the goal of a factor of 10, but they do anticipate that utilities will incorporate photovoltaics in their generation mix as prices come down. (DCK)

5678 Geothermal energy: a viable energy source for health facilities. Berg, G.W. (Health Resources Administration, Hyattsville, MD). *Public Health Reports*; 96: No. 2, 99-104 (Mar 1981).

Health facilities can often take advantage of geothermal energy for their water - and space-heating needs. The technology is available and the resources are widespread, particularly in the western states. Existing warm - or hot-water systems can be adapted to use geothermal water directly or by installing heat-exchange equipment. Corrosion and scale control is necessary in either case. A medical center in Klamath Falls, Oregon and five other hospitals illustrate the expenses and cost savings available in utilizing geothermal energy. Government incentives to encourage industry investments are aimed at reducing the risks for health facilities and lending institutions. Eight sources of information on geothermal energy are listed: 4 federal government, 3 university, and one industrial. 4 references. (DCK)

5679 Long-term biomass research. EPRI (Electric Power Research Institute) Journal; 6: No. 2, 29-32 (Mar 1981).

Washington Report.

Some of DOE's long term R and D programs for biomass are summarized in this article. These include research efforts in the fields of anaerobic digestion, energy farming, short rotation cultivation and aquatic farming. (DMC)

5680 Conservationists cause hesitation in development of Swedish hydroelectric power. *Electrical Review International*; 208: No. 5, 64-65 (6 Feb 1981).

Sweden's present hydro-electric power output is 62TWh/year (approximately 65% of Sweden's electrical generation), and there is an economically feasible potential of 33TWh/year to be developed, most of which is in the Norrbotten area, bordering on Swedish Lapland. More than 15TWh of the power to be developed would come from four rivers in the area - the Vindel, Pite, Torne, and Kalix, but resistance by Swedish nature conservancy organizations to further development of hydro power has stopped plans for development. The conservation movement in Sweden and how it affects hydro-electric power development is discussed, along with planned hydro-electric developments. (JMT)

5681 Evaluating feedstock requirements for a 50-megawatt wood-fired electric-generating unit. Garrett, L.D. (USDA Rocky Mountain Forest and Range Experiment Station, AZ). *Forest Products Journal*; 31: No. 1, 26-30 (Jan 1981).

The economic feasibility and feedstock requirements of a 50-MW commercial wood-fired electric-generating plant located in New England are assessed. Wood fuel stocks that would be utilized at such a plant would be solid or chipped roundwood and mill residues. Parameters considered include heat yield per unit wood weight; steam-boiler efficiency; moisture content; overall plant efficiency; and the comparative costs of wood, oil, and gas fuels. Results indicate that a 50-MW power plant would be expected to use about 273,000 Tpy of wood - 75% from whole tree chips and 25% from mill residues. At current energy prices, wood fuels are considered competitive with all other industrial fuels used in New England. The benefit of using wood for power is directly related to upgrading New England's forests by improving cutting practices. 18 references, 1 graph, 6 tables.

5682 Economic desirability of using wood as a fuel for steam production. Lin, F. (Clarkson Coll. of Tech., Potsdam, NY). *Forest Products Journal*; 31: No. 1, 31-36 (Jan 1981).

A study to determine the economic feasibility of converting gas- or oil-fired steam production plants in New England to wood-fired plants is described. Study results indicate that if wood fuels can be obtained at a price of less than \$20/ton, and if the price of oil or gas is about \$8/million net Btu, the conversion of an oil- or gas-fired plant to wood appears to be economically very attractive. For industrial firms that have plant utilization rates equivalent to 6000 hr/yr at capacity, the rates of return of the conversion could exceed 40%/yr. For educational institutions that utilize their plants at an equivalent of 3000 hr/yr at capacity, the rates of return would be at least 33%/yr. Large power plants could expect to have higher rates of return. 7 references, 1 diagram, 2 graphs, 5 tables.

5683 Financing solar energy: state policy options. Robertson, D.A. (California State Senate, Hollywood). *Journal of Legislation* ; 8: No. 1, 46-61 (Win 1981).

To encourage the use of solar energy resources, the state must organize existing public and private resources. The political and economic conditions for such an effort already exist: consumer dissatisfaction with utility rate increases, pressure on utilities for less expensive alternatives, the maturation of the solar energy industry, and public acceptance of solar energy as one means of meeting the energy challenges of the future. States have the tools to overcome the financial barriers to solar commercialization and to implement a program which will unite consumers, utilities, solar contractors, and private lenders in a cooperative effort to slow the rate of energy cost increases. These tools include tax policies, utility financing arrangements, utility investments, utility loans, and utility credits. By accepting leadership in the search for energy solutions, states will demonstrate that they are the logical, decentralized locus for solar-policy innovation.

5684 Wind energy conversion. Oppedahl, C.J.; Tarduno, M.E. *Harvard Environmental Law Review* ; 5: No. 2, 431-450 (1981).

This article assesses the feasibility of producing significant amounts of electricity with wind-energy-conversion systems. Part I presents background material on the energy-resource potential of wind and on the operation of wind energy conversion systems (WECS). Part II discusses the major economic, technical and environmental considerations, and regulatory constraints relevant to wind-energy use. Because many of these parameters vary with the size of the wind system involved, part II analyzes the economic considerations for wind systems in three categories: small systems used to power individual homes, medium-sized systems used to provide power to neighborhoods and collectives, and large-scale wind projects capable of supplying entire cities. Finally, part III concludes by identifying the most practical and economical methods of wind-energy conversion.

5685 Meeting the solar energy industry's labor needs. Fermoese, R. (Context International, Washington, DC). *Electric Perspectives* ; 9-13 (Win 1980).

A survey of employment opportunities listed in newspaper ads, technical journals, and metropolitan employment offices shows that the largest demand is for workers with traditional skills. This is also true for the solar industry. The job market already reflects the fact that opportunities are not evenly distributed geographically, and this is particularly true for the solar industry. Those interested in solar technologies should keep regional variations in mind as well as the demand for standard skills in other sectors of the economy. (DCK)

5686 Powdered metals as fuels. Bardón, M.F.; Lambert, J.G. (Royal Military Coll. of Canada, Ontario). *Science Progress (Oxford)* ; 66: 421-433 (1980).

In considering any material as a potential fuel, the most-important properties to be evaluated are the quantity of heat released during its combustion, the flame temperature at which combustion occurs, and the phase of combustion products. Metals, because of their unique combustion characteristics, are invaluable in many specialized applications such as pyrotechnic devices, torches, rocket motors, and flashbulbs. Although higher cost, more difficult ignition, and flame-stability problems have so far prevented their widespread use in most combustion systems, dwindling fossil-fuel supplies may ultimately encourage the use of metals as recyclable, pollution-free heat sources. 1 diagram, 11 photos, 2 tables.

5687 Energy for America. Kiefer, I. New York, NY; Atheneum (1980). 202p. \$10.95.

The US must begin to replace abundant and easy-to-get fossil fuels. As costs rise and supplies dwindle, new methods to extract the formerly uneconomical remainder in wells and mines, and from oil shale and oil sands, will help to provide fuels until technology can produce abundant supplies of alternative energies from wind, water, the sun, growing things, and the atom. Each of these is discussed in terms of the technology involved, the experiments being done, and the outlook for the future. Whichever of these forms supply our energy in the future, we have a period of years in which to make relatively minor changes in the way we live. If we wait, the changes will come under emergency conditions, and they will be major. 17 references.



CORPORATE INDEX

In the Corporate Index, report literature is indexed using the name of the organization or institution responsible for issuing the report. Headings are provided for all report literature and for published literature for which a corporate approach is especially desirable, e.g., symposium and conference proceedings.

Each entry under a corporate heading gives the report title and the volume and abstract numbers. Report numbers, if applicable, are given in parentheses at the end of the entry.

DOE Energy Information Data Base: Corporate Author Entries (DOE/TIC-4585) is used in the standardization of corporate entries. DOE/TIC-4585 is available for purchase from the National Technical Information Service (NTIS), U. S. Department of Commerce, Springfield, Virginia 22161.

A

Alliance for Renewable Energy, Sacramento, CA (USA)

Solar Technology Assessment Project. Volume XII. State and community commercialization issues, 7:5649 (DOE/CS/30278—T14)

American Bar Association, Washington, DC

Need for power and the choice of technologies: state decisions on electric power facilities, 7:5568 (DOI/EIP/10004—1)

Argonne National Lab., IL (USA)

Analysis of potential cogeneration impacts on electricity generation by the Central Maine Power Company, 7:5564 (ANL/CNSV-TM 76)

Development of a case study for the Cummamson landfill methane recovery operation, 7:5637 (ANL/CNSV-TM—73)

Environmental assessment on industrial cogeneration demonstration plant at the Riegel Textile Mill site, Ware Shoals, South Carolina, 7:5415 (DOI/TIC—11486)

Guidebook for analysis of state-level economic impacts of an energy shortfall, 7:5447 (ANL/CNSV-TM—70)

Land use and energy, 7:5324 (ANL/AA—19)

Near-term goals for alcohol fuels from biomass: an overview of resource requirements, land use, environmental, and socioeconomic impacts, 7:5638 (ANL/EIS-TM—149)

Oasis code application to proposed Argonne National Laboratory cogeneration plant, 7:5411 (ANL/CNSV-TM—67)

Arizona State Univ., Tempe (USA). Coll. of Architecture

Solar Technology Assessment Project. Volume IV. Solar air conditioning: active, hybrid and passive, 7:5641 (DOE/CS/30278—T5)

Solar Technology Assessment Project. Volume VI. Photovoltaic technology assessment, 7:5645 (DOE/CS/30278—T9)

Ayers (Emory) Associates, Inc., New York (USA)

Analysis of the labor productivity decline in the US bituminous coal mining industry. Final technical report as of June 8, 1981, 7:5500 (DOE/ET/10033—T1)

B

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General safety assessment document for PNL-managed nonreactor nuclear facilities, 7:5392 (PNL—3280)

INFEX guide: summary of US DOE plans and policies for international cooperation in the field of radioactive waste management, 7:5393 (PNL—3774)

Sampling design for the 1980 commercial and multifamily residential building survey, 7:5429 (PNL—3883)

Waste heat and chill storage in aquifer systems, 7:5416 (PNL-SA—9164)

Bendix Field Engineering Corp., Grand Junction, CO (USA)

Statistical data of the uranium industry, 7:5388 (GJO—01664)

Boeing Co., Seattle, WA (USA)

Solar project description for living systems single family residence, Davis, California, 7:5673 (SOLAR/1046—81/50)

Bowdoin Coll., Brunswick, ME (USA)

The benefits of air and water pollution control: a review and synthesis of recent estimates. Executive summary, 7:5334 (PB—81-123838)

Brookhaven National Lab., Upton, NY (USA)

Coal-oil mixtures: an alternative fuel for the commercial markets and large residential markets, 7:5493 (BNL—29773)

Long-range assessment of R & D policy for gas-related conversion technologies and unconventional natural gas resources, 7:5494 (BNL—51208)

Modelling energy-economic interactions in developing countries: a linear-programming approach, 7:5288 (BNL—29747)

Potential supply of synthetic fuels from Alaskan hydroelectric power and coal, 7:5560 (BNL—29764)

Project impact analysis as an optimal control problem, 7:5289 (BNL—29881)

Role of large scale energy systems models in R and D planning, 7:5376 (BNL—29751)

Situation report for petroleum exporting countries, 7:5495 (BNL—51314)

Systems analysis of hydrogen/natural gas supplementation and separation, 7:5559 (BNL—29520)

C

California Energy Resources Conservation and Development

Commission, Sacramento (USA)

Administration of the state fuels set-aside. Annual report to the Legislature, 7:5512 (P—150-81-001)

California Energy Demand 1980 to 2000: revised forecast for consideration in the proceedings on the Third Biennial Report. Volume II. Detailed appendices, 7:5427 (P—102-80-008)

California energy demand 1980 to 2000: revised forecast for consideration in the proceedings on the Third Biennial report. Volume I. Technical report, 7:5279 (P—101-80-008)

California Public Utilities Commission, San Francisco (USA)

California cogeneration and small-power-production pricing study, 7:5412 (DOE/CE/10328—1)

Charles River Associates, Inc., Boston, MA (USA)

Analytical and policy issues in energy economics: selected bibliography, 7:5272 (DOE/EIA/10752—T2)

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Clemson Univ., SC (USA). Water Resources Research Inst.

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Colorado State Univ., Fort Collins (USA). Dept. of Atmospheric Science

Effects of atmospheric variability on energy utilization and conservation. Progress report, 1 January-June 30, 1981, 7:5329 (DOE/ET/10340—1)

- Colorado State Univ., Fort Collins (USA). Solar Energy Applications Lab.
Solar Technology Assessment Project. Volume III. Active space heating and hot water supply with solar energy, 7:5647 (DOE/CS/30278—T12)
- Creighton and Creighton, Saratoga, CA (USA)
Public involvement manual: involving the public in water and power resources decisions, 7:5299 (PB—81-124810)
- Cumberland Development Corp., WI (USA)
Earth-sheltered industrial utility park. Final report, 7:5423 (DOE/R5/10248—T1)

D

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Bibliography of publications dealing with tar sands, 7:5501 (DOE/LETC/R1—81-2)
- Department of Energy, Oak Ridge, TN (USA). Technical Information Center
Information resources in the USA on new and renewable energy: a description and directory, 7:5639 (CONF-810802—2)
- Department of Energy, Washington, DC (USA)
Environmental trends to the year 2000, 7:5326 (DOE/EP—0021)
High-level nuclear-waste disposal: information exchange and conflict resolution, 7:5383 (DOE/ET/46608—1)
- Department of Energy, Washington, DC (USA). Energy Information Administration
Costs and indexes for domestic oil and gas field equipment and production operations, 1980, 7:5496 (DOE/EIA—0185-80)
Nonresidential buildings energy consumption survey: fuel characteristics and conservation practices, 7:5381 (DOE/EIA—0278)
Performance profiles of major energy producers 1979, 7:5497 (DOE/EIA—0206-79)
Venezuela, Trinidad and Tobago: crude oil potential from known deposits, 7:5499 (DOE/EIA—0297)
- Department of Energy, Washington, DC (USA). Office of Oil and Gas Resource Applications
Underground natural gas storage in the United States, 1980 to 1981 heating year (April 1980-March 1981), 7:5498 (DOE/EIA—0239-80)
- Department of Housing and Urban Development, Washington, DC (USA)
Solar project description for living systems single family residence, Davis, California, 7:5673 (SOLAR/1046—81/50)
- Deputy Chief of Staff for Logistics (Army), Washington, DC (USA)
Army energy plan, 7:5446 (AD-A—091569)
- DHR, Inc., Washington, DC (USA)
Supply problems in the solar heating and cooling industry. Final report, 7:5659 (EPRI-EA—1957)

E

- Eastern Plains Council of Governments, Clovis, NM (USA)
Analysis of socioeconomic issues and impact of development of the Bravo Dome carbon dioxide field. Final report, February 1, 1980-January 31, 1981, 7:5359 (NP—1903562)
- Environmental Protection Agency, Ann Arbor, MI (USA)
Report impact analysis for the proposed heavy-duty diesel particulate regulation. Technical report, 7:5463 (PB—81-121949)
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Passenger car fuel economy: EPA and road. A report to the Congress. Final report, 7:5428 (PB—81-111924)
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Metal coil surface coating industry - background information for proposed standards. Final report, 7:5298 (PB—81-121572)
- Environmental Protection Agency, Washington, DC (USA)
Chemical Testing and Assessment Research Committee - research strategy 1979-1985, 7:5333 (PB—81-121105)

F

- Federal Energy Regulatory Commission, Washington, DC (USA). Office of Electric Power Regulation
Hydropower sites of the United States developed and undeveloped: river basin maps showing site locations (conventional, pumped storage, retired), 7:5571 (DOE/TIC—1029964)
- Florida Solar Energy Center, Cape Canaveral (USA)
Solar Technology Assessment Project. Volume IX. Heliostat systems: technical and economic assessment, 7:5648 (DOE/CS/30278—T13)
- Solar Technology Assessment Project. Volume VII. A review of OTEC, 7:5642 (DOE/CS/30278—T6)
- Solar Technology Assessment Project. Volume X. Solar technology assessment: biomass, 7:5646 (DOE/CS/30278—T11)
- Solar Technology Assessment Project. Volume XI. The solar industry in the United States: its status and prospects, 1981, 7:5644 (DOE/CS/30278—T8)
- Solar Technology Assessment Project. Volume XII. State and community commercialization issues, 7:5649 (DOE/CS/30278—T14)
- Florida Technological Univ., Cape Canaveral (USA). FL Solar Energy Center
Solar Technology Assessment Project. Volume II. Passive solar technology, 7:5650 (DOE/CS/30278—T16)
- Solar Technology Assessment Project. Volume III. Active space heating and hot water supply with solar energy, 7:5647 (DOE/CS/30278—T12)
- Solar Technology Assessment Project. Volume IV. Solar air conditioning: active, hybrid and passive, 7:5641 (DOE/CS/30278—T5)
- Solar Technology Assessment Project. Volume V. Solar industrial process heat, 7:5643 (DOE/CS/30278—T7)
- Solar Technology Assessment Project. Volume VI. Photovoltaic technology assessment, 7:5645 (DOE/CS/30278—T9)

G

- General Accounting Office, Washington, DC (USA)
Department of Energy needs to resolve billions in alleged oil-pricing violations, 7:5504 (HMD—81-45)
Further evaluation of the proposed interim consolidation of the Nuclear Regulatory Commission, 7:5385 (HMD—81-76)
- General Atomic Co., San Diego, CA (USA)
Data management in a fusion energy research experiment, 7:5386 (GA-A—16272)
- General Electric Co., Schenectady, NY (USA)
Monitoring and control requirement definition study for dispersed storage and generation (DSG). Final report, Volume I, 7:5601 (NYSERDA—80-15-Vol.1)
Monitoring and control requirement definition study for dispersed storage generation (DSG). Volume III. Appendix B, 7:5602 (NYSERDA—80-15-Vol.3)
- Georgia Inst. of Tech., Atlanta (USA)
Solar Technology Assessment Project. Volume X. Solar technology assessment: biomass, 7:5646 (DOE/CS/30278—T11)
- Gilbert Associates, Inc., Reading, PA (USA)
Modular hydro dam approach to the economic development of ultra low-head hydropower, 7:5566 (CONF-8106137—1)
- Gill Associates, Inc., Washington, DC (USA)
Life-cycle costing for procurement of small buses, 7:5300 (UMTA-R1—06-0007-80-1)
- GRIPS Commission, Santa Rosa, CA (USA)
Geothermal policy development program: expediting the local geothermal permitting process, 7:5654 (DOE/ET/27194—T4)

H

- Harvard Univ., Cambridge, MA (USA). Energy and Environmental Policy Center**
Financial ability of electric utilities to undertake oil-displacement programs, 7:5569 (DOE/PE/70278—T16)
Macroeconomics and oil-supply disruptions, 7:5502 (DOE/PE/70278—T17)
- Hawaii Univ., Honolulu (USA). Hawaii Natural Energy Inst.**
Solar Technology Assessment Project. Volume VII. A review of OTEC, 7:5642 (DOE/CS/30278—T6)
- Houston Univ., TX (USA). Energy Lab.**
Solar Technology Assessment Project. Volume IX. Heliostat systems: technical and economic assessment, 7:5648 (DOE/CS/30278—T13)

I

- Illinois Commerce Commission, Springfield (USA)**
Future powerplant availability: improvement study. Final report, 7:5570 (DOE/RG/06666—T1)
- International Energy Associates Ltd., Washington, DC (USA)**
International safeguards for spent fuel storage, 7:5390 (ORNL/SUB—7605/12-2)
- Iowa State Univ. of Science and Technology, Ames (USA). Dept. of Agricultural Engineering**
Development of a biomass energy system for drying corn. Final report, 1 July 1978-30 June 1981, 7:5421 (DOE/CS/40059—T1)

J

- Jet Propulsion Lab., Pasadena, CA (USA)**
Concepts for design of an energy-management system incorporating dispersed storage and generation, 7:5655 (DOE/ET/29372—1)

L

- Lawrence Berkeley Lab., CA (USA)**
Systems simulation and economic analysis for active solar cooling, 7:5662 (LBL—12752)
Urban ecosystem and resource-conserving urbanism in Third World cities, 7:5357 (LBL—12640)
- Lawrence Livermore National Lab., CA (USA)**
Future of electricity for automobiles: advanced electric vehicle concepts, 7:5431 (UCRL—85526)
Ridesharing and the database management system, 7:5281 (UCRL—86543)
Ultimate in building energy analysis: DOE-2 and BLAST, 7:5278 (LA-UR—81-2288)
- Los Alamos National Lab., NM (USA)**
Attached-sunspace passive solar-heated residences: a study of nationwide patterns of economic feasibility for the existing housing stock, 7:5660 (LA—8889-MS)
Passive-solar-retrofit study for the United States Navy, 7:5661 (LA-UR—81-2200)
Soil loss and leaching, habitat destruction, land and water demand in energy-crop monoculture: some quantitative limits, 7:5330 (LA-UR—81-899)
Tar sand: a petroleum resource of the future, 7:5508 (LA—8936)
Viewpoint on occupational health in the oil-shale industry, 7:5509 (LA-UR—81-2309)

M

- Market Facts, Inc., Arlington, VA (USA)**
Measurement of attitudes toward commercial development of geothermal energy in Federal Region IX. Final report, 7:5658 (DOE/SF/10854—T1)
- Massachusetts Inst. of Tech., Cambridge (USA)**
OESYS: a simulation tool for non-conventional energy applications analysis. Theoretical and operational description with user documentation, 7:5573 (MIT-EL—80-022)
- Massachusetts Inst. of Tech., Cambridge (USA). Energy Lab.**
Electric generation expansion analysis system. A progress report on Pri 1529, 7:5604 (PB—81-119778)
Integration of decentralized generators with the electric power grid, 7:5574 (MIT-EL—81-011)
User's guide to the Venezuelan macrofinancial model, 7:5296 (MIT-EL—81-009)
Water-rights-transfer evaluation procedure with applications for Western energy development, 7:5358 (MIT-EL—79-019)
- Mathtech, Inc., Princeton, NJ (USA)**
Harvesting of close-spaced short-rotation woody biomass, 7:5653 (DOE/ET/23133—T2)
- Michigan Univ., Ann Arbor (USA). Dept. of Mechanical Engineering**
Solar Technology Assessment Project. Volume XI. The solar industry in the United States: its status and prospects, 1981, 7:5644 (DOE/CS/30278—T8)
- Mid-American Solar Energy Complex, Minneapolis, MN (USA)**
Seminars for private college administrators on solar applications for college buildings, 7:5663 (MASEC-CF—81-038)
- Mill Creek Energy Sunworks, Healdsburg, CA (USA)**
Solar-wood stove domestic heating systems. Final report, 7:5656 (DOE/SF/01952—T1)
- Ministry of Housing, Ottawa, Ontario (Canada)**
Residential site design and energy conservation. Part 1: general report, 7:5424 (NP—1904010)
- Mitre Corp., McLean, VA (USA). METREK Div.**
Status of the DOE battery and electrochemical technology program II, 7:5377 (DOE/ET/25407—1)

N

- National Research Council, Washington, DC (USA)**
Analytical studies for the U.S. Environmental Protection Agency. Volume VI. Implications of environmental regulations for energy production and consumption, 7:5459 (PB—81-116501)
- National Technical Information Service, Springfield, VA (USA)**
Fuel consumption: industrial, residential, and general studies. 1977-October 1980 (citations from the NTIS data base). Report for 1977-October 1980, 7:5630 (PB—81-800369)
- New York Energy Office, Albany (USA)**
New York State energy master plan and long-range electric and gas report. Volume 1. Executive summary. Final report, 7:5460 (PB—81-118028)
New York State energy master plan and long-range electric and gas report. Volume 2. Appendices. Final report, 7:5461 (PB—81-118036)
New York State energy master plan and long-range electric and gas report. Volume 3. Final report, 7:5462 (PB—81-118044)

O

- Oak Ridge Associated Universities, Inc., TN (USA)**
Individual biomass facility reports supplement to some employment and earnings implications of regional biomass energy utilization: New England and the cornbelt states, 7:5664 (ORAU—181B)
Response of the oceans to increasing atmospheric carbon dioxide, 7:5331 (ORAU/IEA—81-6(M))

Oak Ridge National Lab., TN (USA)

- Annual cycle energy system experimental performance and national applicability, 7:5420 (CONF-810812—32)
 - Business performance and vertical integration, 7:5290 (CONF-800820—13)
 - Effect of forced ventilation on house infiltration, 7:5426 (ORNL/CONF—75)
 - Empirical investigation of the rural cooperatives residential demand for electricity, 7:5565 (CONF-810744—1)
 - Environmental compliance program handbook, 7:5511 (ORNL/EIS—171)
 - Impact of environmental control costs on an indirect coal liquefaction process, 7:5510 (ORNL—5722)
 - International safeguards for spent fuel storage, 7:5390 (ORNL/SUB—7605/12-2)
 - Passive cooling and heating program at Oak Ridge National Laboratory for FY-1981, 7:5640 (CONF-810832—5)
- Oregon Solar Energy Industries Association, Portland (USA)**
Oregon Solar Business Directory, 7:5674 (WSUN—75)

P

Peat, Marwick, Mitchell and Co., San Francisco, CA (USA)

- Responses to comments of air transport association of America on aircraft towing feasibility study, 7:5422 (DOE/CS/50069—T1)

R

Resource Analysis, Inc., Waltham, MA (USA)

- Analysis barriers to improving the hydroelectric power interface with electric power systems. Final report, 7:5603 (PB—81-117244)

Resource Planning Associates, Inc., San Francisco, CA (USA)

- Electric-Utility Rate-Design Study: proceedings of the rate-design-study regional conferences, 7:5575 (NP—22596)

Response Analysis Corp., Princeton, NJ (USA)

- National Interim Energy-Consumption Survey. Part I. Household and utility-company surveys, 7:5624 (DOE/EIA/10085—T1(Pt.1))
- National Interim Energy-Consumption Survey. Part IV. Transportation panel. Including Appendices A through C, 7:5627 (DOE/EIA/10085—T1(Pt.4))
- National Interim Energy-Consumption Survey. Part II. Household and utility-company surveys. Appendix A, 7:5625 (DOE/EIA/10085—T1(Pt.2))
- National Interim Energy-Consumption Survey. Part V. Transportation panel. Appendices D through H, 7:5628 (DOE/EIA/10085—T1(Pt.5))
- National Interim Energy-Consumption Survey. Part VI. Energy assessment, 7:5629 (DOE/EIA/10085—T1(Pt.6))
- National Interim Energy-Consumption Survey. Part III. Household and utility-company surveys. Appendices B through G, 7:5626 (DOE/EIA/10085—T1(Pt.3))

S

Sandia National Labs., Albuquerque, NM (USA)

- Sandia program in geothermal technology development, 7:5666 (SAND—81-1490C)

Sierra Nevada Coll., Incline Village (USA)

- Solar-wood stove domestic heating systems. Final report, 7:5656 (DOE/SF/01952—T1)

Solar Energy Research Inst., Golden, CO (USA)

- Appliance efficiency and the solar building, 7:5632 (SERI/TR—721-1119)
- Comparative study of four building energy simulations: Phase II; DOE-2.1, BLAST-3.0, SUNCAT-2.4, and DEROB-4, 7:5671 (SERI-TP—721-1326)

Comparison of residential window distributions and effects of mass and insulation, 7:5669 (SERI/TP—721-1300)

Electric coheating experiment to determine the heat-loss coefficient of a double-envelope house, 7:5631 (SERI/TP—721-1316)

Energy end-use requirements in manufacturing, 7:5633 (SERI/TR—733-790R(Vol.1))

Energy end-use requirements in manufacturing, 7:5634 (SERI/TR—733-790R(Vol.2))

Energy end-use requirements in manufacturing, 7:5635 (SERI/TR—733-790R(Vol.3))

Performance analysis of 11 Denver Metro passive homes, 7:5670 (SERI/TP—721-1325)

Wind power for developing nations, 7:5672 (SERI/TR—762-966)

South Carolina Energy Research Inst., Columbia (USA)

Residual-energy-application program: EAST-facility requirements document, 7:5413 (DOE/ET/12866—8-Vol.1)

Residual-energy-applications program: EAST-facility requirements document, 7:5414 (DOE/ET/12866—8-Vol.2)

Residual-Energy-Applications Program environmental analysis report, 7:5327 (DOE/ET/12866—5)

SRI International, Menlo Park, CA (USA)

Energy-economy study methods and transit cases. Final report, 7:5448 (DOE/CS/50189—T1)

Sussman (Arthur J.), Point Arena, CA (USA)

Solar-wood stove domestic heating systems. Final report, 7:5656 (DOE/SF/01952—T1)

Syracuse Univ., NY (USA), Inst. for Energy Research

Energy conservation in museums, 7:5425 (NYSERDA—80-27)

T

Tennessee Univ., Knoxville (USA), Energy, Environment and Resources Center

Solar Technology Assessment Project. Volume V. Solar industrial process heat, 7:5643 (DOI/CS/30278—T7)

Tennessee Valley Authority, Chattanooga (USA), Office of Power

Program summary, 7:5430 (TVA/OEP/13R—81-19)

U

USDOE Assistant Secretary for Conservation and Renewable Energy, Washington, DC

Power and transmission-rate orders and related documents. Office of power marketing coordination: data compiled through December 1979, 7:5567 (DOI/CF—0007)

USDOE Assistant Secretary for Management and Administration, Washington, DC

DOE Property Management Regulations, 7:5274 (DOI/MA—0021)

W

Western Solar Utilization Network, Portland, OR (USA)

Oregon Solar Business Directory, 7:5674 (WSUN—75)

Western Sun, Portland, OR (USA)

Solar Technology Assessment Project. Volume XII. State and community commercialization issues, 7:5649 (DOE/CS/30278—T14)

Westinghouse Electric Corp., East Pittsburgh, PA (USA), Advanced Systems Technology Div.

Economic assessment of advanced central-receiver solar-thermal power systems. Executive summary, 7:5657 (DOE/SF/10601—0)

Wharton (E.F.A.), Inc., Philadelphia, PA (USA)

DOE analysis of the appropriate size of the strategic petroleum reserve, 7:5503 (DOE/US—31017)

Y

Yale Univ., New Haven, CT (USA)

Solar Technology Assessment Project. Volume II. Passive solar
technology, 7:5650 (DOE/CS/30278—T16)

AUTHOR INDEX

Authors' surnames are indexed in the form appearing in the abstracted publication; given names are reduced to initials. Each author entry gives the publication title and the citation number. Report numbers, if applicable, are given in parentheses at the end of the entry. For publications with multiple authors, an author entry is provided for each. Entries for the second and succeeding authors give references to the first author.

Because of problems involved in the mechanical preparation of this index, all accent marks are omitted. Changes in spelling introduced as a result of accent omission follow standard conventions.

A

- Aamodt, P.L., Tar sand: a petroleum resource of the future, 7:5508 (LA—8936)
- Abdoo, R.A., Load research, 7:5582 (NP—22596, pp 147-166)
- Al Khafaf, A.A.R., Comparative economics of basic industries in the Arabian Gulf region, 7:5301
- Alfiana, S., User's guide to the Venezuelan macrofinancial model, 7:5296 (MIT—81-009)
- Amagionu, P., See Hadden, S.G., 7:5383
- Anandalingam, G., Project impact analysis as an optimal control problem, 7:5289 (BNL—29881)
- Anderson, J.V., See Ortega, J.K.E., 7:5631
- Anderson, T.C., See Funk, V.T., 7:5496
- Anthony, S., See Craft, R., 7:5467
- Arnold, O., Expected future development of nuclear energy until the year 2000, 7:5401
- Ash, T., Air quality and urban waterfront development: a review of government regulations and attitudes, 7:5353
- Axelrod, R.S., Energy and the environment: conflict and resolution, 7:5345
Environment, energy, public policy: toward a rational future, 7:5344
- Bailey, J., See Craft, R., 7:5467
- Baker, J.E., See Robeck, K.E., 7:5324
- Ballou, S.W., See Robeck, K.E., 7:5324
- Bardon, M.F., Powdered metals as fuels, 7:5686
- Barr, W.J., See Cullen, D.E., 7:5653
- Bauerschmidt, R., Energy inquiry of the West German Parliament. 4 ways into the future, 7:5394
- Baum, D., Outside investors spark growth of cogeneration, 7:5417
- Baxter, V.D., Annual cycle energy system experimental performance and national applicability, 7:5420 (CONF-810812—32)
- Bazelon, D.L., Science and uncertainty: a jurist's view, 7:5332
- Beatty, R., See Krawiec, F., 7:5635
See Limaye, D.R., 7:5633, 7:5634
- Beller, M., Systems analysis of hydrogen/natural gas supplementation and separation, 7:5559 (BNL—29520)
See Hermelee, A., 7:5495
- Benard, A., World oil and cold reality, 7:5540
- Berck, P., Optimal management of renewable resources with growing demand and stock externalities, 7:5364
- Berg, G.W., Geothermal energy: a viable energy source for health facilities, 7:5678
- Berk, R.A., Reducing consumption in periods of acute scarcity: the case of water, 7:5360
- Berkowitz, J., See Nainis, W.S., 7:5305
- Berman, S., See Meier, R.L., 7:5357
- Berry, W.W., Load management, 7:5595 (NP—22596, pp 415-441)
- Beschinskii, A.A., General problems of the world fuel-energy situation (on the basis of the 11th World Energy Conference), 7:5449
- Betts, M., Energy plan: prices to spur conservation, 7:5434
- Bhandari, J.S., Simple macroeconomics of an oil-dependent economy, 7:5524
- Bingham, C.E., See Ortega, J.K.E., 7:5631
- Bingman, D.J., Oasis code application to proposed Argonne National Laboratory cogeneration plant, 7:5411 (ANL/CNSV-TM—67)
- Birchfield, J.L., See Sheppard, A.P., 7:5646
- Bird, T.C., Coal leases held real property, 7:5530
- Bowen, W.M., Sampling design for the 1980 commercial and multifamily residential building survey, 7:5429 (PNL—3883)
- Bower, B.T., See Kneese, A.V., 7:5323
- Bower, R.S., Ratemaking: the problem now is the art, 7:5606
- Brandt, L.D., Issues concerning heliostat commercialization, 7:5665 (SAND—80-8049, pp 155-156)
- Brewer, M., See Berk, R.A., 7:5360
- Brinkman, R.I., Mankind at the starting point, 7:5311

B

- Backman, G.E., General safety assessment document for PNL-managed nonreactor nuclear facilities, 7:5392 (PNL—3280)
- Baer, W., Toward a service-oriented growth strategy, 7:5293
- Baes, C.F. Jr., Response of the oceans to increasing atmospheric carbon dioxide, 7:5331 (ORAU/IEA—81-6(M))

- Briseoe, J., Energy use and social structure in a Bangladesh village, 7:5294
- Broek, H.R., See King, H.G., 7:5522
- Broome, K.R., Modular hydro dam approach to the economic development of ultra low-head hydropower, 7:5566 (CONF-8106137—1)
- Brown, E.D., Delimitation of offshore areas: hard labour and bitter fruits at UNCLOS III, 7:5335
- Brown, H.L., See Hameel, B.B., 7:5451
- Brown, M., Photovoltaics: matching policy to technology, 7:5677
- Browne, G.R., Load management and controls, 7:5587 (NP—22596, pp 255-274)
- Bryson, J.E., Load-management evaluation, 7:5596 (NP—22596, pp 443-452)
- Bucheley, W.F., Development of a biomass energy system for drying corn. Final report, 1 July 1978-30 June 1981, 7:5421 (DOE/CS-40059-11)
- Baden, L., Load management, 7:5594 (NP—22596, pp 395-414)
- Buis, G., Nuclear threat: can Europe build a common defense, 7:5399
- Burns, C.C., See Reiter, E.R., 7:5329
- Burstein, K., Power and the environment: a case study of the siting of 765-kilovolt transmission line, 7:5614
- Butcher, T.A., Coal-oil mixtures: an alternative fuel for the commercial markets and large residential markets, 7:5493 (HNL—29773)

C

- Camel, A.B., Alternative energy forms and the aged, 7:5307
- Campbell, T., See Meier, R.L., 7:5357
- Canter, L.W., Handbook of variables for environmental impact assessment, 7:5356
- Cantieri, W.F., CCT: energy statement and its application to Pennsylvania, 7:5273
- Carbone, R., See Winslow, B., 7:5300
- Carlsen, E.H., Analysis of the recycling coefficients of non-ferrous metals in the US economy, 1959-1976, 7:5369
- Carter, J., See Morghen, K., 7:5656
- Caskey, B.C., See Kelsey, J.R., 7:5666
- Cerny, K.J., See Hadden, S.G., 7:5383
- Chang, M.S., Balanced urban ground-passenger transportation with respect to energy, demand, and income: an approach for bus-transit supply-system planning, 7:5443
- Chern, W.S., See Maddigan, R.J., 7:5565
- Cheng, J.G., See Lumsdaine, E., 7:5652
- Chester, C.V., See Shapira, H.B., 7:5640

Chiles, J.R., See Hadden, S.G., 7:5383
 Chiu, S.Y., See Robeck, K.E., 7:5324
 Christensen, C., See Hannifan, M., 7:5669
 Christensen, L.R., Models for forecasting energy use in the US farm sector. Volume 2. Final report, 7:5277 (EPRI-EA-1956-Vol.2)
 Clear, P.W. II, See Buchele, W.F., 7:5421
 Claridge, D.E., Performance analysis of 11 Denver Metro passive homes, 7:5670 (SERI/TP-721-1325)
 Clark, J.A., Solar Technology Assessment Project. Volume XI. The solar industry in the United States: its status and prospects, 1981, 7:5644 (DOE/CS/30278-T8)
 Cochran, H., See Reiter, E.R., 7:5329
 Cohn, S.M., Fuel choice and aggregate energy demand in the residential and commercial sectors, 7:5456
 Colville, G., See Krawiec, F., 7:5635
 See Limaye, D.R., 7:5633; 7:5634
 Connolly, J.M., See Ortega, J.K.E., 7:5631
 Conrat, R., See Morghen, K., 7:5656
 Cook, F.X., See Hill, F.E., 7:5500
 Cooper, T.F., See Berk, R.A., 7:5360
 Coopey, J.F., Taiwan, 7:5482
 Corey, G.R., Long-term outlook for the electric-power business, 7:5599 (NP-22596, pp 499-519)
 Corrigan, R., Alaska natural gas may never reach the Lower 48 if the price is too high, 7:5526
 On energy policy, the administration prefers to duck, defer, and deliberate, 7:5465
 Rising energy prices: what's good for some states is bad for others, 7:5286
 Cortner, H.J., Institutional limits to national public planning for forest resources: the Resources Planning Act, 7:5365
 Crabbe, D., Electricity demand forecasting: realism at last, 7:5618
 Craft, R., Case studies in state solar legislation, 7:5467
 Crane, F., See Kratzer, M., 7:5390
 Creighton, J.L., Public involvement manual: involving the public in water and power resources decisions, 7:5299 (PB-81-124810)
 Cross, E., See Winslow, B., 7:5300
 Callen, D.E., Harvesting of close-spaced short-rotation woody biomass, 7:5653 (DOE/ET/23133-T2)
 Curtis, C., What we know about acid rain, 7:5352

D

D'Acierno, J., See Beller, M., 7:5559
 See Hermelce, A., 7:5495
 D'Alesio, G., See Halsey, J., 7:5638
 Dahl, C.A., Refinery mix in the US, Canada, and the EEC, 7:5523
 Dancke, G.A., Institutional constraints upon environmentally sound energy policy, 7:5349
 Dautzvardis, P.A., See Robeck, K.E., 7:5324
 Davis, M.J., See Robeck, K.E., 7:5324
 Dean, N.L., Solar energy and the law, 7:5483

del Calvo y Gonzalez, J.A., Markets in air: problems and prospects of controlled trading, 7:5343
 Dempsey, P.S., Oil pollution by ocean vessels - an environmental tragedy: the legal regime of flags of convenience, multilateral conventions, and coastal states, 7:5350
 Oil shale and water quality: the Colorado prospectus under federal, state, and international law, 7:5534
 Denitz, P., Urban waterfront: planning perspectives and energy facility siting, 7:5317
 Dietzman, W.D., Venezuela, Trinidad and Tobago: crude oil potential from known deposits, 7:5499 (DOE/EIA-0297)
 Diawoodie, T.L., OESYS: a simulation tool for non-conventional energy applications analysis. Theoretical and operational description with user documentation, 7:5573 (MIT-EL-80-022)
 Doctor, R.D., Solar Technology Assessment Project. Volume XII. State and community commercialization issues, 7:5649 (DOE/CS/30278-T14)
 Doering, G.C., See Ucar, M., 7:5425
 Douglas, J., Movement toward conservation, 7:5572
 Douglas, J.H., See Ricci, P.F., 7:5340
 Drobnis, D., See Glad, A., 7:5386
 Dworin, L., Taxation of United States investment in oil and gas exploration, development, and production in selected countries, 7:5302

E

Eagleton, T.F., Washington legislative outlook on energy, 7:5553
 Edgemond, T.D., Regulation of coal surface mining in a Federal system, 7:5527
 Eltason, J.R., Waste heat and chill storage in aquifer systems, 7:5416 (PNL-SA-9164)
 Elliott, J.F., United States v. New Mexico: purposes that hold no water, 7:5375
 Ellis, H.T., See Henderson, C., 7:5448
 Erickson, K.P., Brazil, 7:5479
 Everitt, N., Off-peak storage heating: the British experience, 7:5409

F

Farahat, A.M., Energy, environment, and new communities in hot-arid areas of the Middle East, 7:5321
 Fells, I., Nuclear energy: the way ahead, 7:5398
 Ferguson, W.L., See Friedlaender, A.F., 7:5410
 Fermoselle, R., Meeting the solar energy industry's labor needs, 7:5685
 Fernandes, J.H., Alternative energy technologies: blueprint for the future, 7:5453

Fessler, E.A., Directed-energy weapons: a juridical analysis, 7:5396
 Finger, S., Integration of decentralized generators with the electric power grid, 7:5574 (MIT-EL-81-011)
 Fischer, R.F., Load management, 7:5597 (NP-22596, pp 453-470)
 Fisher, J.F., See Johnson, P.J., 7:5510
 Fitzgerald, C., See Meier, R.L., 7:5357
 Fitzpatrick, G.L., Load research, 7:5580 (NP-22596, pp 117-131)
 Flavin, C., Petroleum: too valuable to burn, 7:5541
 Flax, S.J., Radioactive waste management, 7:5400
 Ford, D., Taking technology to market, 7:5378
 Forster, B.A., Separability, functional structure, and aggregation for a class of models in environmental economics, 7:5336
 Freeman, A.M. III, The benefits of air and water pollution control: a review and synthesis of recent estimates. Executive summary, 7:5334 (PB-81-123838)
 Freiwald, J.G., See Aamodi, P.L., 7:5508
 Friedlaender, A.F., Rate structure of unit coal trains in the 1970s, 7:5410
 Fry, R.C. Jr., See Hubbard, R.G., 7:5502
 Funk, V.T., Costs and indexes for domestic oil and gas field equipment and production operations, 1980, 7:5496 (DOE/EIA-0185-80)
 Fusfeld, D.R., Next great depression II: the impending financial collapse, 7:5310

G

Gabel, H.L., Simultaneous-equation analysis of the structure and performance of the United States petroleum-refining industry, 7:5287
 Gaggioli, R.A., Exergy economics, 7:5282
 Gallagher, C.A., See Maddigan, R.J., 7:5565
 Garrett, L.D., Evaluating feedstock requirements for a 50-megawatt wood-fired electric-generating unit, 7:5681
 Garvey, D.B., See Robeck, K.E., 7:5324
 Gentry, B.S., Public-utility participation in decentralized power production, 7:5613
 Gerstle, J.H., Water-rights-transfer evaluation procedure with applications for Western energy development, 7:5358 (MIT-EL-79-019)
 Gill, R.J. Jr., Intergovernmental restraints on oil and gas developments, 7:5538
 Gillette, J.L., Analysis of potential cogeneration impacts on electricity generation by the Central Maine Power Company, 7:5564 (ANL/CNSV-TM-76)
 Glad, A., Data management in a fusion energy research experiment, 7:5386 (GA-A-16272)
 Golabi, K., Extraction timing and economic incentives for geothermal reservoir management, 7:5675
 Goppel, M., European view of energy problems, 7:5558

Gray, L., Decision theoretic model of Congressional technology assessment: a theoretical examination of the characteristics of complete assessment reports, with applications, 7:5379

Green, A.E.S., Coal burning issues, 7:5505

Greenwood, T., Supply-side non-proliferation, 7:5382

Grevenow, D.E., Natural gas-retail, 7:5544

Greynolds, O.L., Strategic offensive nuclear forces of the United States: a linear-programming model, 7:5406

Grier, R.S., See Voelz, G.L., 7:5509

Gunnison, F., Guidebook for analysis of state-level economic impacts of an energy shortfall, 7:5447 (ANL/CNSV-TM-70)

Gupta, C.L., Domestic energy consumption in India (Pondicherry region), 7:5636

Gutschick, V.P., Soil loss and leaching, habitat destruction, land and water demand in energy-crop monoculture: some quantitative limits, 7:5330 (LA-UR-81-899)

Guttmann, J.M., Pennsylvania's technologically impossible air-pollution standards upheld, 7:5339

H

Hadden, S.G., High-level nuclear-waste disposal: information exchange and conflict resolution, 7:5383 (DOE/ET/46608-1)

Haeefe, W., Energy in a finite world: a global systems analysis, 7:5454

Haffa, R. Jr., See Greenwood, T., 7:5382

Haffey, J.D., Trends and issues in retail rate design: the Montana experience or the Montana Power Company experience, 7:5547

Halsey, J., Near-term goals for alcohol fuels from biomass: an overview of resource requirements, land use, environmental, and socioeconomic impacts, 7:5638 (ANL/EES-TM-149)

Hamel, B.B., Review of industrial energy use, 7:5451 (SERI/CP-633-1145, pp 131-137)

Hammoudeh, S.M., Optimal oil-pricing policy for Saudi Arabia, 7:5549

Hamrin, J., See Doctor, R.D., 7:5649

Handl, G., Managing nuclear wastes: the international connection, 7:5397

Hannay, F., Recent Developments in Colorado groundwater law, 7:5371

Hannifan, M., Comparison of residential window distributions and effects of mass and insulation, 7:5669 (SERI/TP-721-1300)

Hanson, D., Financial ability of electric utilities to undertake oil-displacement programs, 7:5569 (DOE/PE/70278-T16)

Hargis, K.M., See Voelz, G.L., 7:5509

Harmon, K.M., INFx guide: summary of US DOE plans and policies for international cooperation in the field of radioactive waste management, 7:5393 (PNL-3774)

Harris, W.L., See Harris, W.M., 7:5351

Harris, W.M., Noise pollution in urban ghettos: assessment, issues and challenges, 7:5351

Harrison, D. Jr., Role of local government in energy policy, 7:5485

Hart, G., US energy self-reliance will ensure national security, 7:5464

Hart, P., Load control, 7:5585 (NP-22596, pp 207-232)

Hartnett, J.P., Future powerplant availability: improvement study. Final report, 7:5570 (DOE/RG/06666-T1)

Hayes, G.B., See Dean, N.L., 7:5483

Hazard, D., See Halsey, J., 7:5638

Hedley, D., World Energy: the facts and the future, 7:5450

Heffernan, G.A., See Cambel, A.B., 7:5307

Heiser, R.A. III, European natural gas exploration urged as alternative to Siberian pipeline, 7:5517

Heiser, D., Report impact analysis for the proposed heavy-duty diesel particulate regulation. Technical report, 7:5463 (PB-81-121949)

Helling, L.L., See Dempsey, P.S., 7:5350

Henderson, C., Energy-economy study methods and transit cases. Final report, 7:5448 (DOE/CS/50189-T1)

Herhal, A.J., See Hill, F.E., 7:5500

Hermeele, A., Situation report for petroleum exporting countries, 7:5495 (BNL-51314)

See Beller, M., 7:5559

Herrin, A.N., Rural electrification and fertility change in the southern Philippines, 7:5623

Hevert, H.W., Second-law analysis: an alternative indicator of system efficiency, 7:5283

Hevert, S.C., See Hevert, H.W., 7:5283

Hildebrandt, A.F., Solar Technology Assessment Project. Volume IX. Helio-stat systems: technical and economic assessment, 7:5648 (DOE/CS/30278-T13)

Hildreth, R.G. Jr., International financing by electric utilities, 7:5619

Hill, F.E., Analysis of the labor productivity decline in the US bituminous coal mining industry. Final technical report as of June 8, 1981, 7:5500 (DOE/ET/10033-T1)

Hill, L.G., See Canter, L.W., 7:5356

Hoel, M., Resource extraction by a monopolist with influence over the rate of return on non-resource assets, 7:5304

Holcombe, R.G., Strategic Petroleum Reserve: an economic perspective, 7:5531

Hosmer, C., What if we reversed the What If syndrome, 7:5402

Hub, K.A., See Gillette, J.L., 7:5564

Hubbard, R.G., Macroeconomics and oil-supply disruptions, 7:5502 (DOE/PE/70278-T17)

Hundemann, A.S., Fuel consumption: industrial, residential, and general studies. 1977-October 1980 (citations from the NTIS data base). Report for 1977-October 1980, 7:5630 (PB-81-80369)

Hunn, B.D., Ultimate in building energy analysis: DOE-2 and BLAST, 7:5278 (LA-UR-81-2288)

Iannucci, J.J., Market potential for high temperature process heat, 7:5667 (SERI/CP-633-1145, pp 125-129)

Immerman, W., See Kratzer, M., 7:5390

Ingram, H., See Laney, N., 7:5346

Isler, R.J., See Butcher, T.A., 7:5493

Iser, S., See Krawiec, F., 7:5635

See Limaye, D.R., 7:5633, 7:5634

J

Jaffar, K.M., OPEC: present and future responsibility, 7:5552

James, D.D., Issues in indigenous research and development in Third World countries, 7:5313

Jansen, P., Models as a help in energy policy decisions, 7:5487

Jedlicka, A.D., See James, D.D., 7:5313

Johnson, G.R., See Reiter, E.R., 7:5329

Johnson, P.J., Impact of environmental control costs on an indirect coal liquefaction process, 7:5510 (ORNL-5722)

Judkoff, R., Comparative study of four building energy simulations: Phase II; DOE-2.1, BLAST-3.0, SUNCAT-2.4, and DEROB-4, 7:5671 (SERI-TP-721-1326)

K

Kameyama, H., On the concept of standard energy, 7:5285

Kaplan, S.L., See Shupria, H.B., 7:5640

Kapur, A., International nuclear proliferation: multilateral diplomacy and regional aspects, 7:5408

Karakl, S., Solar Technology Assessment Project. Volume III. Active space heating and hot water supply with solar energy, 7:5647 (DOE/CS/30278-T12)

Kasper, K., See Michaelis, H., 7:5404

Katzenstein, A.W., More power, less pollution, 7:5610

Kavrakoglu, I., Models for national energy policy analysis and planning, 7:5457

Kawaoka, K., See Halsey, J., 7:5638

Kelley, D.R., Soviet Union, 7:5476

Kelley, G., Politics and administration in Mexico: recruitment and promotion of the politico-administrative class, 7:5458

Kelman, J.A., See Harmon, K.M., 7:5393

Kelsey, J.R., Sandia program in geothermal technology development, 7:5666 (SAND-81-1490C)

Kendall, R., See Brown, M., 7:5677

Klefer, I., Energy for America, 7:5687

Kim, S.S., People's Republic of China, 7:5478

Kincade, W.H., US civil-defense decision-making: the Ford and Carter administrations, 7:5407

King, B.G., Financial disclosures for oil and gas producers, 7:5522

- Kirkham, H., Concepts for design of an energy-management system incorporating dispersed storage and generation, 7:5655 (DOE/ET/29372—1)
- Kirschner, C., See Roach, F., 7:5660
- Kneese, A.V., Environmental quality and residuals management, 7:5323
- Knutson, R.D., Coping with the General Mining Law of 1872 in the 1980's, 7:5372
- Koelling, G.W., Underground natural gas storage in the United States, 1980 to 1981 heating year (April 1980-March 1981), 7:5498 (DOE/EIA—0239-80)
- Koerner, T., See Kirkham, H., 7:5655
- Koskelainen, L., Optimal dimensioning of district-heating networks, 7:5419
- Kraft, J., Temporal cross-section specification of the demand for gasoline using a random-coefficient regression model, 7:5455
- Kraft, M.E., Congress and national energy policy: assessing the policymaking process, 7:5484
- Kratzer, M., International safeguards for spent fuel storage, 7:5390 (ORNL/SUB—7605-12-2)
- Krawiec, F., Energy end-use requirements in manufacturing, 7:5635 (SERI/TR—733-790R(Vol.3))
- See Limaye, D.R., 7:5633; 7:5634
- Krawiec, F., Lang, K., See Krawiec, F., 7:5635
- Kreth, F., Economics of solar energy and conservation systems. Volume III. Energy management and conservation, 7:5439
- Krohta, B.J., See Hill, F.E., 7:5500
- Kuehn, R.R., Shifting sands of Federal barrier-islands policy, 7:5341
- Kuestler, D.A., Customer attitudes, 7:5588 (NP—22596, pp 275-288)
- Kydes, A.S., Long-range assessment of R & D policy for gas-related conversion technologies and unconventional natural gas resources, 7:5494 (BNL—51208)
- utility industry employing the Williamson expense-preference theory in a pooled regression model, 7:5615
- Lechner, M., See Douglas, J., 7:5572
- Lelstritz, F.L., See Murdock, S.H., 7:5322
- Leo, J., Load research, 7:5583 (NP—22596, pp 167-188)
- Leone, R.A., Capacity strategies for the 1980s, 7:5308
- Leong, H., See Reiter, E.R., 7:5329
- Leslie, N.P., See Bingman, D.J., 7:5411
- Leuschner, H.J., Coal and nuclear energy. A basis for a secure energy supply, 7:5380
- Levins, W.P., Effect of forced ventilation on house infiltration, 7:5426 (ORNL/CON—75)
- Lifton, R.J., Prevention of nuclear war, 7:5384
- Limaye, D.R., Energy end-use requirements in manufacturing, 7:5633 (SERI/TR—733-790R(Vol.1))
- Energy end-use requirements in manufacturing, 7:5634 (SERI/TR—733-790R(Vol.2))
- See Krawiec, F., 7:5635
- Lin, F., Economic desirability of using wood as a fuel for steam production, 7:5682
- Lioukas, S.K., Order-delivery lag in electricity investment, 7:5611
- Lirioff, R.A., NEPA litigation in the 1970s: a deluge or a dribble, 7:5337
- Loef, G.O.G., See Karaki, S., 7:5647
- Lornell, R., Purpa primer, 7:5466
- Lowe, B., See Crabbe, D., 7:5618
- Lumsdaine, E., Evaluation of solar water heating and solar active cooling in New Mexico. Final report, 7:5652
- Luttrell, C.B., Bushel of wheat for a barrel of oil: can we offset OPEC's gains with a grain cartel, 7:5507
- Lyness, F.K., Gas demand in severe weather: aspects of forecasting and planning, 7:5532
- Marten, B.M., Regulation of the transportation of hazardous materials: a critique and a proposal, 7:5342
- Massie, H.W., Jr., Natural gas pricing: policy and impact on the local community, 7:5542
- Maxey, M.N., Nuclear genie: beyond Faust, fate, and incantations, 7:5403
- McAfee, J., Energy and the future: a crossroads for the world, 7:5555
- McCaughy, J., Retail battle for conservation dollars, 7:5437
- McDonald, A., Energy in a finite world: executive summary, 7:5452
- McDonald, D., See Aliana, S., 7:5296
- McDonald, S.L., Incidence and effects of the crude oil Windfall Profit Tax, 7:5528
- McHarg, B., See Glad, A., 7:5386
- McIntyre, R.L., Load control at Detroit Edison, 7:5586 (NP—22596, pp 233-254)
- McKee, M., See West, E.G., 7:5518
- McMurray, B.J., See Backman, G.E., 7:5392
- Meeker, F.O., See Dean, N.L., 7:5483
- Meier, P., Modelling energy-economic interactions in developing countries: a linear-programming approach, 7:5288 (BNL—29747)
- Meier, R.L., Urban ecosystem and resource-conserving urbanism in Third World cities, 7:5377 (LBL—12640)
- Melius, C.F., See Iannucci, J.J., 7:5667
- Menzel, D.C., See Edmiston, T.D., 7:5527
- Merchant, B., EPA's emission offset policy and energy facility siting, 7:5354
- Meyer, J.R., See Leone, R.A., 7:5308
- Michaelis, H., Activities of the inquiry commission on the future nuclear policy. Findings and discussion, 7:5404
- Medema, A.K., Time-of-use rate studies with residential customers, 7:5589 (NP—22596, pp 289-316)
- Mikhail, A., Wind power for developing nations, 7:5672 (SERI/TR—762-966)
- Miles, C.R., See Wray, W.O., 7:5661
- Miller, A.S., See Dean, N.L., 7:5483
- Miller, J.G., Natural gas rate design in Wisconsin, 7:5446
- Morell, D., Economics of permitting: an approach, 7:5318
- Impacts of permitting delays on investment desirability, 7:5319
- Policies for energy facility siting on the urban coast, 7:5320
- Refining the waterfront. Alternative energy facility siting policies for urban coastal areas, 7:5314
- Morell, D., Coastal zone conflicts and urban opportunities, 7:5315
- Morgen, K., Solar-wood stove domestic heating systems. Final report, 7:5656 (DOE/SF/01952—T1)
- Morris, H.G. Jr., See Knutson, R.D., 7:5372
- Morrow, R., See Winslow, B., 7:5300
- Mosher, L., Acid rain fallout threatens subsidies for utilities that convert to coal, 7:5490
- If there's a national water crisis, you can't tell it in Washington, 7:5362
- Nation's ailing timber industry finds it has a friend in Washington, 7:5363

M

- LaCivita, C.J., See Berk, R.A., 7:5360
- Laios, J.G., Effect of water law on the development of oil shale, 7:5355
- Lambert, J.G., See Bardon, M.F., 7:5686
- Lamontagne, J., Role of large scale energy systems models in R and D planning, 7:5376 (BNL—29751)
- Lande, R.H., Peak load pricing lowers generation costs, 7:5617
- Landsberg, H.H., Energy policy: DOs and DON'Ts for the 1980s, 7:5488
- Laney, N., Disincentives for policy leadership in energy and the environment: the structure of voter opinion, 7:5346
- Lang, K., See Limaye, D.R., 7:5633, 7:5634
- Larson, M.A., Investigation into environmental activism, 7:5325
- Laurence, C.L., See Hildebrandt, A.F., 7:5648
- Lawler, W.C., Efficiency measurement in the regulated sector: an empirical study of the Massachusetts electric
- Mabbs-Zeno, C.C., Institutional purpose and the management of Virginia's coastal wetlands, 7:5374
- Maddigan, R.J., Business performance and vertical integration, 7:5290 (CONF-800820—13)
- Empirical investigation of the rural cooperatives residential demand for electricity, 7:5565 (CONF-810744—1)
- Madison, C., Higher prices or gasoline lines loom if Iran-Iraq war lasts into spring, 7:5275
- Malko, J.R., Cost and rates, 7:5576 (NP—22596, pp 11-32)
- Maloney, M.T., An economic analysis of the effects of regulatory delay on nuclear power plant construction. Technical report, 7:5391 (PB—81-124422)
- Manuel, E.H., See Hill, F.E., 7:5500
- Marchand, J.P., See Craft, R., 7:5467
- Marks, D.H., See Gerstle, J.H., 7:5358
- Marley, S.J., See Buchele, W.F., 7:5421
- Marshall, W., Politics, plutonium, and energy interdependence, 7:5389

- Reagan, with OMB's list in hand, take dead aim at EPA's regulations, 7:5470
- Mubayi, V., See Meier, P., 7:5288
- Murdoch, S.H., Energy development in the western United States: impact on rural areas, 7:5322
- Murray, F.X., All the easy questions have been answered, 7:5543
- Murrell, D., Passenger car fuel economy: EPA and road. A report to the Congress. Final report, 7:5428 (PB—81-111924)
- Myers, N., Exhausted earth, 7:5366

N

- Nainis, W.S., Macroeconomic and social impacts of solar energy development, 7:5305
- Nash, G.D., Energy crises in historical perspective, 7:5529
- Nath, K.R., Common sense approach to conservation, 7:5444
- Nielson, D.C., See Schirra, G.W., 7:5637
- Nieves, A.L., See Bowen, W.M., 7:5429
- Nightingale, D., See Kirkham, H., 7:5655
- Nisbett, R.T., Analysis of socioeconomic issues and impact of development of the Bravo Dome carbon dioxide field. Final report, February 1, 1980. January 31, 1981, 7:5359 (NP—1903562)
- Nisick, N.P., See Backman, G.E., 7:5392

O

- O'Connell, L.G., Future of electricity for automobiles: advanced electric vehicle concepts, 7:5431 (UCRI—85526)
- O'Doherty, B., See Judkoff, R., 7:5671
- O'Keefe, W.F., American petroleum problems and the future outlook, 7:5557
- Oatman, E., Load-management application and evaluation, 7:5592 (NP—22596, pp 351-366)
- Oliver, C.D., Interim deep-seabed mining legislation: an international environmental perspective, 7:5368
- Olsen, A.R., See Bowen, W.M., 7:5429
- Oppedahl, C.J., Wind energy conversion, 7:5684
- Ortega, J.K.E., Electric coheating experiment to determine the heat-loss coefficient of a double-envelope house, 7:5631 (SERI/TP—721-1316)
- Owens, S.E., Energy: why planners must be involved, 7:5472

P

- Paddock, J.L., MIT world oil project outlook, 7:5556
- Palmer, H., Cost-based rates, 7:5577 (NP—22596, pp 33-69)
- Parker, S., See Berk, R.A., 7:5360
- Perkins, R., See Hannifan, M., 7:5669

- Perry, H., Public utility regulation and the decade ahead, 7:5620
- Pesiri, E.G., See Stoney, C.J. Jr., 7:5676
- Phung, D.L., Cost comparison of energy projects: discounted cash flow and revenue-requirement methods, 7:5309
- Plummer, J., Load-management evaluation, 7:5591 (NP—22596, pp 341-349)
- Powell, J.R., See Steinberg, M., 7:5560

Q

- Quenon, R.H., Coal's participation in world energy supplies, 7:5554

R

- Rabinowitz, J., See Kydes, A.S., 7:5494
- Raffidi, N.R., See Dietzman, W.D., 7:5499
- Randall, L.R.R., Mexico, 7:5480
- Rao, K.U., See Gupta, C.L., 7:5636
- Reese, T., Surface owner's estate becomes dominant: Wyoming's surface owner consent statute, 7:5539
- Relly, J.J., Hydrogen storage in metal hydrides, 7:5562
- Reiter, E.R., Effects of atmospheric variability on energy utilization and conservation. Progress report, 1 January-June 30, 1981, 7:5329 (DOE/EV/01340—1)
- Repetto, R., Economics of visibility protection: on a clear day you can see a policy, 7:5338
- Reynolds, S.P., Customer response, 7:5590 (NP—22596, pp 317-339)
- Progress with PURPA: the activities of Pacific Gas and Electric Company in meeting the requirements of Section 133 of the Public Utility Regulatory Policies Act of 1978, 7:5622
- Rhodes, J.J., Developing a national water policy: problems and perspectives on reform, 7:5367
- Ricci, P.F., Three challenges of risk-benefit assessment, 7:5340
- Richey, C.R., See Backman, G.E., 7:5392
- Roach, F., Attached-sunspace passive solar-heated residences: a study of nationwide patterns of economic feasibility for the existing housing stock, 7:5660 (LA—8889-MS)
- Robeck, K.E., Land use and energy, 7:5324 (ANL/AA—19)
- Roberti, D.A., Financing solar energy: state policy options, 7:5683
- Roberts, R., Status of the DOE battery and electrochemical technology program II, 7:5377 (DOE/ET/25407—1)
- Robinson, C., Water for oil shale: framework for the legal issues, 7:5533
- Robson, A.J., Costly innovation and natural resources, 7:5373
- Rodekohl, M., See Kraft, J., 7:5455
- Rodriguez, E., See Smith, W.J.A., 7:5519
- Roe, S. L., Recapture of intangible drilling and development costs: a discussion of the proposed regulations, 7:5291

- Rohrer, W.M. Jr., Industrial energy management, 7:5440
- Rosen, D.J., United States, 7:5475
- Rosenbaum, W.A., Notes from no man's land: the politics and ecology of energy research and development, 7:5347
- Royston, M.G., Making pollution prevention pay, 7:5328
- Ruegg, R.T., Microeconomics of solar energy, 7:5306
- Rustow, D.A., Will oil imports be available: and at what price, 7:5536
- Ruth, P., Court overrules insulation standard set by Pennsylvania utility, 7:5435
- Ryan, C., See Ford, D., 7:5378

S

- Samelson, K.S., See Waring, S.L., 7:5370
- Samuelson, I., See Baer, W., 7:5293
- Samuelson, R.J., Auto: a prosperous past... a dubious future, 7:5295
- Forecast for the refining industry: a 100% chance of political chaos, 7:5491
- Sandrock, G.D., See Reilly, J.J., 7:5562
- Sav, G.T., See Ruegg, R.T., 7:5306
- Schaefer, J., Equipment for load management, 7:5584 (NP—22596, pp 189-205)
- Schaffer, P., Figuring on energy: politics of drawdown, 7:5516
- Scherer, C.R., See Golabi, K., 7:5675
- Schewitzer, D.L., See Cortner, H.J., 7:5365
- Schirra, G.W., Development of a case study for the Cinnaminson landfill methane recovery operation, 7:5637 (ANL/CNSV-TM 73)
- Schmoelling, K., See Bauerschmidt, R., 7:5394
- Seligson, C.H., See Hildreth, R.G. Jr., 7:5619
- Shapiro, H.B., Passive cooling and heating program at Oak Ridge National Laboratory for FY-1981, 7:5640 (CONF-810832 5)
- Shapiro, M.H., See Harrison, D. Jr., 7:5485
- Sharma, V.C., Direct energy conversion: an attractive option for developing countries, 7:5651
- Sharp, T.E., See Schirra, G.W., 7:5637
- Sheaffer, J.D., See Reiter, E.R., 7:5329
- Sheppard, A.P., Solar Technology Assessment Project. Volume X. Solar technology assessment: biomass, 7:5646 (DOE/CSS/30278—T11)
- Simms, D.A., See Claridge, D.E., 7:5670
- Singer, G., People and petrochemicals: sitting controversies on the urban waterfront, 7:5316
- See Morell, D., 7:5314, 7:5318, 7:5319
- See Morell, D., 7:5315
- Singer, J.W., Who will set the standards for groups that set industry product standards, 7:5438
- Singh, S.P.N., See Johnson, P.J., 7:5510
- Sloss, J., See Friedlander, A.F., 7:5410
- Smallwood, E.W., Standby or supplemental rates, 7:5548
- Smith, C.B., Electrical power management in industry, 7:5441

- Smith, T., New oil contract escalator seen cutting NYC fuel bills, 7:5515
- Smith, T.A., See Hermele, A., 7:5495
- Smith, W.J.A., Effective tax planning for Mexican operations, 7:5519
- Smock, R.W., Garbage-to-electricity. Part 1. Success elusive in garbage power, 7:5608
- Soloman, B., See Morghen, K., 7:5656
- Solomon, B.D., Gasohol, economics, and passenger-transportation policy, 7:5561
- South, D.W., See Robeck, K.E., 7:5324
- Spiegel, L.G., Demand control: a cost-effective approach, 7:5612
- Sparlock, J.M., See Sheppard, A.P., 7:5646
- Sredi, K., See Berk, R.A., 7:5360
- Stalon, C.G., Microeconomic decision-making in an unstable macroeconomic environment, 7:5297 (NP—22596, pp 521-531)
- Stanfield, R.L., See Corrigan, R., 7:5286
- Steinberg, M., Potential supply of synthetic fuels from Alaskan hydroelectric power and coal, 7:5560 (BNL—29764)
- Stephens, K., See Halsey, J., 7:5638
- Stevens, B.J., See Stewart, R.R. Jr., 7:5520
- Stevenson, R., Measuring technological bias, 7:5492
- Stewart, R.R. Jr., Taxation of coal: an update, 7:5520
- Stoney, C.J. Jr., Application of I.R.C. Section 617 to geothermal exploratory costs, 7:5676
- Street, J.H., See James, D.D., 7:5313
- Stunkel, K.R., Introduction: energy and the future of nations, 7:5474
- Japan, 7:5477
- National energy profiles, 7:5473
- Sueda, M., Japan's unique energy situation, 7:5489
- Sussman, A.J., See Morghen, K., 7:5656
- Swidler, J.C., Regulation and the electric-utility industry, 7:5600 (NP—22596, pp 533-540)
- Swisher, J., Appliance efficiency and the solar building, 7:5632 (SERI/TR 721-1119)

T

- Taasevigen, D., Ridesharing and the database management system, 7:5281 (UCRL—86543)
- Tarduno, M.E., See Oppedahl, C.J., 7:5684
- Tennican, M., Cost and rates: marginal cost, 7:5578 (NP—22596, pp 71-92)
- Thomas, J.P., Incremental pricing, 7:5545
- Thompson, G.P., Building to save energy: legal and regulatory approaches, 7:5445
- See Dean, N.L., 7:5483
- Thompson, J.R., Comparative study of the impacts of Energy and Man's Environment upon fifth-grade students, 7:5276
- Tiedeken, R., Access rights for the solar user: in search of the best statutory approach, 7:5486
- Tixier, S., Tribal severance taxes: outside the purview of the commerce clause, 7:5469
- Torpy, M.F., See Robeck, K.E., 7:5324

- Tracy, E.J., Appalachian coal turns green, 7:5514
- Exxon gets serious about shale, 7:5525
- Trakman, L.E., Nonperformance in oil contracts, 7:5521

U

- Ucar, M., Energy conservation in museums, 7:5425 (NYSERDA—80-27)
- Uhr, R.G., Cost and rates, 7:5579 (NP—22596, pp 93-115)
- Electricity pricing and national energy policy, 7:5621
- Ulmer, M.J., Multinational corporations and Third World capitalism, 7:5292
- Utroska, D., Locally-owned utilities see margins plummet; but revenues up appreciably, 7:5607

V

- Vall, B., Grants, costs spur hospital energy-conservation efforts, 7:5433
- Vasudevaraju, V.A., See Gupta, C.L., 7:5636
- Velocci, T., Burning questions about natural gas, 7:5513
- Energy: elusive solutions, 7:5284
- Voelz, G.L., Viewpoint on occupational health in the oil-shale industry, 7:5509 (LA-UR—81-2309)

W

- Wahlig, M., See Warren, M., 7:5662
- Walsh, M.D., See Maloney, M.T., 7:5391
- Walsh, M.E., See Robinson, C., 7:5533
- Waring, S.L., Non-Indian federal-reserved water rights, 7:5370
- Warner, A.J., See Dietzman, W.D., 7:5499
- Warren, M., Systems simulation and economic analysis for active solar cooling, 7:5662 (LBL—12752)
- Webb, S.B., Impact of increased alcohol production on agriculture: a simulation study, 7:5361
- Welch, B.L., Nuclear power risks: challenge to the credibility of science, 7:5355
- Wenner, L.M., Energy-environmental trade-offs in the courts: nuclear and fossil fuels, 7:5348
- Wepfer, W.J., See Gaggioli, R.A., 7:5282
- Weslowski, J., Capability of US to meet demand causes concern, 7:5616
- West, E.G., Public choice of price control and rationing of oil, 7:5518
- West, R.E., See Kreith, F., 7:5439
- Westly, S., Energy efficiency and the utilities: new directions, 7:5605
- Westmueller, H., Documents on the problems connected with the peaceful use of nuclear power. Facts, problems, interrelationships, basic concepts and principles underlying the opinions stated, comments by the church, literature references, 7:5395

- Wham, R.M., See Johnson, P.J., 7:5510
- Whitney, D., Load research, 7:5581 (NP—22596, pp 133-146)
- Whitting, L.J., See Lyness, F.K., 7:5532
- Whyte, D., Load management, 7:5593 (NP—22596, pp 367-393)
- Williams, E.W. Jr., National Transportation Policy Study Commission and its final report: a review, 7:5312
- Williams, J.R., Economic analysis of the feasibility of the retort pouch for packaging fruit and vegetable commodities in an environment of rising energy prices, 7:5442
- Wilson, E.J. III, Nigeria, 7:5481
- Winslow, B., Life-cycle costing for procurement of small buses, 7:5300 (UMTA-RI—06-0007-80-1)
- Witholder, R.E. Jr., Regional assessment of solar thermal energy, 7:5668 (SERI/CP—633-1145, pp 139-144)
- Wunder, E., See Kratzer, M., 7:5390
- Wortman, D., See Judkoff, R., 7:5671
- Wray, W.O., Passive-solar-retrofit study for the United States Navy, 7:5661 (LA-UR—81-2200)

Y

- Yeats, A.J., Influence of trade and commercial barriers on the industrial processing of natural resources, 7:5303
- Yellin, J., High technology and the courts: nuclear power and the need for institutional reform, 7:5387
- Yngve, P.W., Residual-energy-application program: EAST-facility requirements document, 7:5413 (DOE/ET/12866—8-Vol.1)
- Residual-energy-applications program: EAST-facility requirements document, 7:5414 (DOE/ET/12866—8-Vol.2)
- Yoshida, K., See Kameyama, H., 7:5285
- Yuen, P.C., Solar Technology Assessment Project. Volume VII. A review of OTEC, 7:5642 (DOE/CS/30278—T6)

Z

- Zander, F.H., See Yngve, P.W., 7:5413, 7:5414
- Zielinski, C.A., Load management, 7:5598 (NP—22596, pp 471-498)
- Zimmer, M.J., Upgrading energy efficiency requires tax incentives, 7:5436
- Zimmerman, O., See Douglas, J., 7:5572

SUBJECT INDEX

The subject index is based on the use of subject descriptors selected from a controlled thesaurus of terms. Subject descriptors and qualifiers (subheadings) are selected and presented in the following format:

SUBJECT DESCRIPTOR

Qualifier

Title, (supplementary information), citation number, (report number)

The title may be supplemented with additional words, or a phrase, if it appears additional information would be helpful. In cases for which the title contains little or no information related to the subject entry, it may be replaced entirely by the supplementary information. A qualifier is not always required, and in such cases the title will follow the unqualified subject descriptor.

The descriptors selected for use as subject terms are generally the names of specific materials, things, or processes. To the extent possible, a qualifier is selected to describe the properties of, or processes applied to, the subject term.

Index entries are selected to indicate the important ideas and concepts presented in a document, rather than words that may appear in the text. Within the available thesaurus terms, the most probable or logical place to look for typical information is selected. "See references" are included to guide users from synonymous terms or phrases to the descriptor selected as a subject heading for the concept. (e.g. Pipeline Quality Gas see HIGH BTU GAS). "See also references" are used to indicate where to find references to subject concepts that are narrower, broader, or related to a particular subject heading. To complete an exhaustive search of a given subject, all such headings should be reviewed.

A

ACID RAIN

Environmental Impacts

Acid rain fallout threatens subsidies for utilities that convert to coal, 7:5490

Coal burning issues (Book - monograph), 7:5505

Information Needs

All the easy questions have been answered, 7:5543

What we know about acid rain, 7:5352

Land Pollution

Acid rain fallout threatens subsidies for utilities that convert to coal, 7:5490

AGE GROUPS

See also ELDERLY PEOPLE

Energy Demand

Alternative energy forms and the aged, 7:5307

AGED

See ELDERLY PEOPLE

AGRICULTURAL RESIDUES

See AGRICULTURAL WASTES

AGRICULTURAL WASTES

Combustion

Development of a biomass energy system for drying corn. Final report, 1 July 1978-30 June 1981, 7:5421

(DOE/CS/40059—T1)

AGRICULTURE

See also FARMS

Energy Consumption

Models for forecasting energy use in the US farm sector. Volume 2. Final report, 7:5277 (EPRI-EA—1956-Vol.2)

Energy Models

Models for forecasting energy use in the US farm sector. Volume 2. Final report, 7:5277 (EPRI-EA—1956-Vol.2)

Ethanol Fuels

Impact of increased alcohol production on agriculture: a simulation study, 7:5361

AIR CONDITIONERS

See also SOLAR AIR CONDITIONERS

Remote Control

Load control at Detroit Edison, 7:5586 (NP—22596)

AIR INFILTRATION

Flow Rate

Effect of forced ventilation on house infiltration, 7:5426 (ORNL/CON—75)

AIR POLLUTION

Deregulation

Reaganites, with OMB's list in hand, take dead aim at EPA's regulations, 7:5470

Standards

Report impact analysis for the proposed heavy-duty diesel particulate regulation. Technical report, 7:5463 (PB—81-121949)

AIR POLLUTION ABATEMENT

Economic Impact

Markets in air: problems and prospects of controlled trading, 7:5343

Economics

Economics of visibility protection: on a clear day you can see a policy, 7:5338

Legal Aspects

Markets in air: problems and prospects of controlled trading, 7:5343

AIR POLLUTION CONTROL

Cost Benefit Analysis

The benefits of air and water pollution control: a review and synthesis of recent estimates. Executive summary, 7:5334 (PB—81-123838)

AIR QUALITY

Environmental Policy

Air quality and urban waterfront development: a review of government regulations and attitudes, 7:5353

AIRCRAFT

Fuel Economy

Responses to comments of air transport association of America on aircraft towing feasibility study, 7:5422 (DOE/CS/50069—T1)

AIRPORTS

Energy Conservation

Responses to comments of air transport association of America on aircraft towing feasibility study, 7:5422 (DOE/CS/50069—T1)

ALASKA

Hydroelectric Power

Potential supply of synthetic fuels from Alaskan hydroelectric power and coal, 7:5560 (BNL—29764)

ALASKA GAS PIPELINE

Financing

Alaska natural gas may never reach the Lower 48 if the price is too high, 7:5526

ALCOHOL FUELS

See also ETHANOL FUELS

Environmental Impacts

Near-term goals for alcohol fuels from biomass: an overview resource requirements, land use, environmental, and socioeconomic impacts, 7:5638 (ANL/EES-TM—149)

Land Requirements

Near-term goals for alcohol fuels from biomass: an overview resource requirements, land use, environmental, and socioeconomic impacts, 7:5638 (ANL/EES-TM—149)

Socio-Economic Factors

Near-term goals for alcohol fuels from biomass: an overview of resource requirements, land use, environmental, and socioeconomic impacts, 7:5638 (ANL/EES-TM—149)

ALTERNATE FUELS

See *FUEL SUBSTITUTION*
SYNTHETIC FUELS

ALUMINIUM**Combustion Kinetics**

Powdered metals as fuels, 7:5686

ANL

(Argonne National Laboratory.)

Dual-Purpose Power Plants

Oasis code application to proposed Argonne National Laboratory cogeneration plant, 7:5411 (ANL/CNSV-TM—67)

ANNUAL CYCLE ENERGY SYSTEM**Coefficient of Performance**

Annual cycle energy system experimental performance and national applicability, 7:5420 (CONF-810812—32)

ANTHRACITE**Energy Shortages**

Anthracite coal shortages. Hearing before the Subcommittee on Energy and Mineral Resources of the Committee on Energy and Natural Resources, United States Senate, Ninety-Seventh Congress, First Session, 7:5537

APPALACHIA**Coal Industry**

Appalachian coal turns green, 7:5514

APPARATUS

See *EQUIPMENT*

APPLIANCES

See also *AIR CONDITIONERS*
CLOTHES DRYERS
WATER HEATERS
WOOD BURNING APPLIANCES

Energy Consumption

Appliance efficiency and the solar building, 7:5632 (SERI/TR—721-1119)

Specifications

National Interim Energy-Consumption Survey. Part VI. Energy assessment, 7:5629 (DOE/EIA/10085—T1(Pt.6))

APPROPRIATE TECHNOLOGY

See also *TECHNOLOGY UTILIZATION*

Economic Impact

Toward a service-oriented growth strategy, 7:5293

AQUIFERS**Heat Storage**

Waste heat and chill storage in aquifer systems, 7:5416 (PNL-SA—9164)

AREA POLLUTION SOURCES

See *POLLUTION SOURCES*

ARGONNE NATIONAL LABORATORY

See *ANL*

ATOMIC BOMBS

See *NUCLEAR WEAPONS*

ATOMIC WEAPONS

See *NUCLEAR WEAPONS*

ATTACHED GREENHOUSES**Economic Analysis**

Attached-sunspace passive solar-heated residences: a study of nationwide patterns of economic feasibility for the existing housing stock, 7:5660 (LA—8889-MS)

Feasibility Studies

Attached-sunspace passive solar-heated residences: a study of nationwide patterns of economic feasibility for the existing housing stock, 7:5660 (LA—8889-MS)

AUDITORY ORGANS**Physiology**

Noise pollution in urban ghettos: assessment, issues and challenges, 7:5351

AUTOMOBILES**Deregulation**

Reaganites, with OMB's list in hand, take dead aim at EPA's regulations, 7:5470

Fuel Consumption

National Interim Energy-Consumption Survey. Part IV. Transportation panel. Including Appendices A through C, 7:5627 (DOE/EIA/10085—T1(Pt.4))

National Interim Energy-Consumption Survey. Part V. Transportation panel. Appendices D through H, 7:5628 (DOE/EIA/10085—T1(Pt.5))

Fuel Economy

Passenger car fuel economy: EPA and road. A report to the Congress. Final report, 7:5428 (PB—81-111924)

Hydrogen Storage

Hydrogen storage in metal hydrides, 7:5562

Political Aspects

Auto: a prosperous past...a dubious future, 7:5295

B**BANGLADESH****Energy Demand**

Energy use and social structure in a Bangladesh village, 7:5294

Sociology

Energy use and social structure in a Bangladesh village, 7:5294

BATTERIES (ELECTRIC)

See *ELECTRIC BATTERIES*

BENZENE**Deregulation**

Reaganites, with OMB's list in hand, take dead aim at EPA's regulations, 7:5470

BIOMASS

(All growing organic matter such as plants, trees, grasses, and algae.)

See also *AGRICULTURAL WASTES*

MAIZE

SUGAR CANE

TREES

WOOD

Energy Source Development

Near-term goals for alcohol fuels from biomass: an overview of resource requirements, land use, environmental, and socioeconomic impacts, 7:5638 (ANL/EES-TM—149)

Environmental Impacts

Soil loss and leaching, habitat destruction, land and water demand in energy-crop monoculture: some quantitative limits, 7:5330 (LA-UR—81-899)

Research Programs

Long-term biomass research, 7:5679

Resource Assessment

Earth-sheltered industrial utility park. Final report, 7:5423 (DOE/R5/10248—T1)

Near-term goals for alcohol fuels from biomass: an overview of resource requirements, land use, environmental, and socioeconomic impacts, 7:5638 (ANL/EES-TM—149)

Technology Assessment

Solar Technology Assessment Project. Volume X. Solar technology assessment: biomass, 7:5646 (DOE/CS/30278—T1)

BIOMASS CONVERSION PLANTS**Economic Impact**

Individual biomass facility reports supplement to some employment and earnings implications of regional biomass energy utilization: New England and the cornbelt states, 7:5664 (ORAU—181B)

Employment

Individual biomass facility reports supplement to some employment and earnings implications of regional biomass energy utilization: New England and the cornbelt states, 7:5664 (ORAU—181B)

BIOMASS PLANTATIONS**Harvesting Equipment**

Harvesting of close-spaced short-rotation woody biomass, 7:5653 (DOE/ET/23133—T2)

BITUMINOUS COAL**Production**

Analysis of the labor productivity decline in the US bituminous coal mining industry. Final technical report as of June 8, 1981, 7:5500 (DOE/ET/10033—T1)

BOILER FUELS**Comparative Evaluations**

Economic desirability of using wood as a fuel for steam

production, 7:5682

Evaluating feedstock requirements for a 50-megawatt wood-fired electric-generating unit, 7:5681

BOILERS**Retrofitting**

Coal-oil mixtures: an alternative fuel for the commercial markets and large residential markets, 7:5493 (BNL—29773)

BRAZIL**Economic Development**

Brazil (Book chapter), 7:5479

Energy Consumption

National energy balance, 7:5280

Energy Policy

Brazil (Book chapter), 7:5479

National energy balance, 7:5280

BREAKWATERS

See DAMS

BUILDINGS

See also EARTH-COVERED BUILDINGS

HOSPITALS

HOUSES

OFFICE BUILDINGS

PUBLIC BUILDINGS

RESIDENTIAL BUILDINGS

SCHOOL BUILDINGS

Computer Codes

Ultimate in building energy analysis: DOE-2 and BLAST,

7:5278 (LA-UR—81-2288)

Computerized Simulation

Comparative study of four building energy simulations: Phase

II; DOE-2.1, BLAST-3.0, SUNCAT-2.4, and DEROB-4,

7:5671 (SERI-TP—721-1326)

Energy Analysis

Comparative study of four building energy simulations: Phase

II; DOE-2.1, BLAST-3.0, SUNCAT-2.4, and DEROB-4,

7:5671 (SERI-TP—721-1326)

Ultimate in building energy analysis: DOE-2 and BLAST,

7:5278 (LA-UR—81-2288)

Energy Conservation

Building to save energy: legal and regulatory approaches

(Book), 7:5445

Nonresidential buildings energy consumption survey: fuel

characteristics and conservation practices, 7:5381

(DOE/EIA—0278)

Energy Consumption

Nonresidential buildings energy consumption survey: fuel

characteristics and conservation practices, 7:5381

(DOE/EIA—0278)

Energy Efficiency Standards

Sampling design for the 1980 commercial and multifamily

residential building survey, 7:5429 (PNL—3883)

Heat Storage

Off-peak storage heating: the British experience, 7:5409

Power Demand

Demand control: a cost-effective approach, 7:5612

Regulations

Building to save energy: legal and regulatory approaches

(Book), 7:5445

BUSES

Balanced urban ground-passenger transportation with respect to energy, demand, and income: an approach for bus-transit supply-system planning, 7:5443

Energy Demand

Energy-economy study methods and transit cases. Final report, 7:5448 (DOE/CS/50189—T1)

Life-Cycle Cost

Life-cycle costing for procurement of small buses, 7:5300

(UMTA-R1—06-0007-80-1)

Procurement

Life-cycle costing for procurement of small buses, 7:5300

(UMTA-R1—06-0007-80-1)

CALIFORNIA**Cogeneration**

California cogeneration and small-power-production pricing study, 7:5412 (DOE/CE/10328—1)

Electric Power

Load-management evaluation (From regulatory point of view; California PUC), 7:5596 (NP—22596)

Energy Demand

California energy demand 1980 to 2000: revised forecast for consideration in the proceedings on the Third Biennial report. Volume I. Technical report, 7:5279 (P—101-80-008)

California Energy Demand 1980 to 2000: revised forecast for consideration in the proceedings on the Third Biennial Report. Volume II. Detailed appendices, 7:5427 (P—102-80-008)

Energy Policy

Administration of the state fuels set-aside. Annual report to the Legislature, 7:5512 (P—150-81-001)

CARBON DIOXIDE**Environmental Impacts**

Response of the oceans to increasing atmospheric carbon dioxide, 7:5331 (ORAU/IEA—81-6(M))

Globa Aspects

Coal burning issues (Book - monograph), 7:5505

Resources

Analysis of socioeconomic issues and impact of development of the Bravo Dome carbon dioxide field. Final report, February 1, 1980-January 31, 1981, 7:5359 (NP—1903562)

CARBON MONOXIDE**Deregulation**

Reaganites, with OMB's list in hand, take dead aim at EPA's regulations, 7:5470

CARCINOGENS**Deregulation**

Reaganites, with OMB's list in hand, take dead aim at EPA's regulations, 7:5470

CARPPOOLING**Information Systems**

Ridesharing and the database management system, 7:5281 (UCRL—86543)

CARTELS**Economic Impact**

Bushel of wheat for a barrel of oil: can we offset OPEC's gains with a grain cartel, 7:5507

CENTRALLY PLANNED ECONOMIES**Economic Growth**

Soviet Union (Book chapter), 7:5476

CHINA**Energy Policy**

People's Republic of China (Book chapter), 7:5478

CIVIL DEFENSE**Decision Making**

US civil-defense decision-making: the Ford and Carter administrations, 7:5407

Government Policies

US civil-defense decision-making: the Ford and Carter administrations, 7:5407

CLEAN AIR ACT**Case Law**

Markets in air: problems and prospects of controlled trading, 7:5343

Deregulation

Reaganites, with OMB's list in hand, take dead aim at EPA's regulations, 7:5470

Intergovernmental Cooperation

Pennsylvania's technologically impossible air-pollution standards upheld, 7:5339

CLEAN WATER ACT**Deregulation**

Reaganites, with OMB's list in hand, take dead aim at EPA's regulations, 7:5470

CLIMATES**Variations**

Effects of atmospheric variability on energy utilization and conservation. Progress report, 1 January-June 30, 1981, 7:5329 (DOE/EV/01340—1)

CLOTHES DRYERS**Vents**

Effect of forced ventilation on house infiltration, 7:5426 (ORNL/CON—75)

CMEA

See COMECON

COAL

See also ANTHRACITE
BITUMINOUS COAL

Chemical Composition

Coal burning issues (Book - monograph), 7:5505

Environmental Impacts

All the easy questions have been answered, 7:5543

Coal burning issues (Book - monograph), 7:5505

Quality Control

Detroit Edison reveals coal-evaluation technique: reaps plant savings, 7:5609

Resource Development

Coal burning issues (Book - monograph), 7:5505

Transport

Coal burning issues (Book - monograph), 7:5505

Rate structure of unit coal trains in the 1970s, 7:5410

COAL CHEMICALS

See PETROCHEMICALS

COAL GASIFICATION

Coal burning issues (Book - monograph), 7:5505

COAL GASIFICATION PLANTS**Pollution Laws**

Environmental compliance program handbook, 7:5511 (ORNL/EIS—171)

Pollution Regulations

Environmental compliance program handbook, 7:5511 (ORNL/EIS—171)

COAL INDUSTRY

See also MINERAL INDUSTRY

Energy Source Development

Coal's participation in world energy supplies, 7:5554

Financial Data

Performance profiles of major energy producers 1979, 7:5497 (DOE/EIA—0206-79)

Government Policies

Coal burning issues (Book - monograph), 7:5505

Health Hazards

Coal burning issues (Book - monograph), 7:5505

Productivity

Appalachian coal turns green, 7:5514

Taxes

Taxation of coal: an update, 7:5520

COAL LIQUEFACTION

Coal burning issues (Book - monograph), 7:5505

Commercialization

Japan's unique energy situation, 7:5489

COAL LIQUEFACTION PLANTS**Pollution Laws**

Environmental compliance program handbook, 7:5511 (ORNL/EIS—171)

Pollution Regulations

Environmental compliance program handbook, 7:5511 (ORNL/EIS—171)

COAL LIQUIDS**Cost**

Impact of environmental control costs on an indirect coal liquefaction process, 7:5510 (ORNL—5722)

Prices

Impact of environmental control costs on an indirect coal liquefaction process, 7:5510 (ORNL—5722)

COAL MINERS**Productivity**

Analysis of the labor productivity decline in the US bituminous coal mining industry. Final technical report as of June 8, 1981, 7:5500 (DOE/ET/10033—T1)

COAL MINING

Coal burning issues (Book - monograph), 7:5505

Leases

Coal leases held real property, 7:5530

Productivity

Analysis of the labor productivity decline in the US bituminous coal mining industry. Final technical report as of June 8, 1981, 7:5500 (DOE/ET/10033—T1)

Surface Mining Acts

Regulation of coal surface mining in a Federal system, 7:5527

Taxes

Taxation of coal: an update, 7:5520

COAL-DERIVED LIQUIDS

See COAL LIQUIDS

COASTAL REGIONS**Environmental Policy**

Coastal zone conflicts and urban opportunities, 7:5315

Policies for energy facility siting on the urban coast, 7:5320

Management

Institutional purpose and the management of Virginia's coastal wetlands, 7:5374

Socio-Economic Factors

Refining the waterfront. Alternative energy facility siting policies for urban coastal areas, 7:5314

CO-GENERATION

See COGENERATION

Exergy economics, 7:5282

COGENERATION**Economic Impact**

Analysis of potential cogeneration impacts on electricity generation by the Central Maine Power Company, 7:5564 (ANL/CNSV-TM—76)

Environmental assessment on industrial cogeneration demonstration plant at the Riegel Textile Mill site, Ware Shoals, South Carolina, 7:5415 (DOE/TIC—11486)

Energy Policy

California cogeneration and small-power-production pricing study, 7:5412 (DOE/CE/10328—1)

Environmental Impacts

Environmental assessment on industrial cogeneration demonstration plant at the Riegel Textile Mill site, Ware Shoals, South Carolina, 7:5415 (DOE/TIC—11486)

Social Impact

Environmental assessment on industrial cogeneration demonstration plant at the Riegel Textile Mill site, Ware Shoals, South Carolina, 7:5415 (DOE/TIC—11486)

COLORADO**Ground Water**

Recent Developments in Colorado groundwater law, 7:5371

Oil Shale Mining

Effect of water law on the development of oil shale, 7:5535

Water for oil shale: framework for the legal issues, 7:5533

Water Rights

Water for oil shale: framework for the legal issues, 7:5533

COLORADO RIVER**Water Pollution Control**

Oil shale and water quality: the Colorado prospectus under federal, state, and international law, 7:5534

Water Rights

Effect of water law on the development of oil shale, 7:5535

COMECON

(Council for Mutual Economic Assistance.)

Energy Supplies

Expected future development of nuclear energy until the year 2000, 7:5401

Reserves

Expected future development of nuclear energy until the year 2000, 7:5401

COMMERCIAL SECTOR**Energy Conservation**

Energy plan: prices to spur conservation, 7:5434

Energy Demand

Fuel choice and aggregate energy demand in the residential and commercial sectors, 7:5456

Fuel Substitution

Coal-oil mixtures: an alternative fuel for the commercial markets and large residential markets, 7:5493 (BNL—29773)

Time-of-Use Pricing

Customer response (At Pacific Gas and Electric Co.), 7:5590 (NP—22596)

COMMERCIALIZATION

See also **ECONOMIC DEVELOPMENT**
TECHNOLOGY TRANSFER
TECHNOLOGY UTILIZATION

Economic Impact

What if we reversed the What If syndrome, 7:5402

Political Aspects

What if we reversed the What If syndrome, 7:5402

COMMUNITIES**Environmental Engineering**

Energy, environment, and new communities in hot-arid areas of the Middle East, 7:5321

Planning

Energy, environment, and new communities in hot-arid areas of the Middle East, 7:5321

COMPOUNDS (ORGANIC)

See **ORGANIC COMPOUNDS**

COMPUTER CODES**Comparative Evaluations**

Comparative study of four building energy simulations: Phase II; DOE-2.1, BLAST-3.0, SUNCAT-2.4, and DEROB-4, 7:5671 (SERI-TP—721-1326)

O Codes

Oasis code application to proposed Argonne National Laboratory cogeneration plant, 7:5411 (ANL/CNSV-TM—67)

OESYS: a simulation tool for non-conventional energy applications analysis. Theoretical and operational description with user documentation, 7:5573 (MIT-EL—80-022)

CONSERVATION (ENERGY)

See **ENERGY CONSERVATION**

CONSERVATION (RESOURCE)

See **RESOURCE CONSERVATION**

CONSTRUCTION INDUSTRY**Environmental Impacts**

Noise pollution in urban ghettos: assessment, issues and challenges, 7:5351

CONSTRUCTION PERMITS**Cost**

Impacts of permitting delays on investment desirability, 7:5319

CONSUMER PROTECTION**Deregulation**

Reaganites, with OMB's list in hand, take dead aim at EPA's regulations, 7:5470

Information

Energy savers: some work, some don't, some are just plain gyms, 7:5432

CONSUMPTION RATES**Economic Elasticity**

Reducing consumption in periods of acute scarcity: the case of water, 7:5360

CONTRACTS

New oil contract escalator seen cutting NYC fuel bills, 7:5515

CORN (MAIZE)

See **MAIZE**

CORN STOVER

See **AGRICULTURAL WASTES**

COST BENEFIT ANALYSIS**Recommendations**

Science and uncertainty: a jurist's view, 7:5332

COUNTY BUILDINGS

See **PUBLIC BUILDINGS**

COURT BUILDINGS

See **PUBLIC BUILDINGS**

CRUDE OIL

See **PETROLEUM**

D**DAMS****Retrofitting**

Modular hydro dam approach to the economic development of ultra low-head hydropower, 7:5566 (CONF-8106137—1)

DEATH**Public Opinion**

Prevention of nuclear war, 7:5384

DEREGULATION**Government Policies**

Energy forecast: partial clearing, 7:5471

Reaganites, with OMB's list in hand, take dead aim at EPA's regulations, 7:5470

DEVELOPED COUNTRIES**Energy Policy**

National energy profiles (Book), 7:5473

DEVELOPING COUNTRIES**Appropriate Technology**

Toward a service-oriented growth strategy, 7:5293

Economic Development

Issues in indigenous research and development in Third World countries, 7:5313

Multinational corporations and third world capitalism, 7:5292

Economics

Project impact analysis as an optimal control problem, 7:5289 (BNL—29881)

Energy Consumption

Domestic energy consumption in India (Pondicherry region), 7:5636

Energy Models

Modelling energy-economic interactions in developing countries: a linear-programming approach, 7:5288 (BNL—29747)

Energy Policy

National energy profiles (Book), 7:5473

Energy Systems

Modelling energy-economic interactions in developing countries: a linear-programming approach, 7:5288 (BNL—29747)

Resource Conservation

Urban ecosystem and resource-conserving urbanism in Third World cities, 7:5357 (I.B.L.—12640)

Trade

Influence of trade and commercial barriers on the industrial processing of natural resources, 7:5303

Wind Power

Wind power for developing nations, 7:5672 (SERI/TR—762-966)

Wind Turbines

Wind power for developing nations, 7:5672 (SERI/TR—762-966)

Wind-Powered Pumps

Wind power for developing nations, 7:5672 (SERI/TR—762-966)

DIESEL ENGINES**Air Pollution**

Report impact analysis for the proposed heavy-duty diesel particulate regulation. Technical report, 7:5463 (PB—81-121949)

Deregulation

Reaganites, with OMB's list in hand, take dead aim at EPA's regulations, 7:5470

DIESEL FUELS**Allocations**

Administration of the state fuels set-aside. Annual report to the Legislature, 7:5512 (P—150-81-001)

Consumption Rates

National Interim Energy-Consumption Survey. Part IV. Transportation panel. Including Appendices A through C, 7:5627 (DOE/EIA/10085—T1(Pt.4))

National Interim Energy-Consumption Survey. Part V. Transportation panel. Appendices D through H, 7:5628 (DOE/EIA/10085—T1(Pt.5))

DIRECT GAIN SYSTEMS**Design**

Solar project description for living systems single family residence, Davis, California, 7:5673 (SOLAR/1046—81/50)

Energy Analysis

Comparative study of four building energy simulations: Phase II; DOE-2.1, BLAST-3.0, SUNCAT-2.4, and DEROB-4, 7:5671 (SERI-TP—721-1326)

DIRECT-ENERGY WEAPONS

Legal Aspects

Directed-energy weapons: a juridical analysis (Book), 7:5396

DISPERSED STORAGE AND GENERATION

Control

Concepts for design of an energy-management system incorporating dispersed storage and generation, 7:5655 (DOE/ET/29372-1)

Control Systems

Monitoring and control requirement definition study for dispersed storage and generation (DSG). Final report, Volume I, 7:5601 (NYSERDA-80-15-Vol.1)

Monitoring and control requirement definition study for dispersed storage generation (DSG). Volume III. Appendix B, 7:5602 (NYSERDA-80-15-Vol.3)

Economic Impact

Monitoring and control requirement definition study for dispersed storage and generation (DSG). Final report, Volume I, 7:5601 (NYSERDA-80-15-Vol.1)

Monitoring and control requirement definition study for dispersed storage generation (DSG). Volume III. Appendix B, 7:5602 (NYSERDA-80-15-Vol.3)

Research Programs

Program summary, 7:5430 (TVA/OP/ECR-81-19)

Technology Assessment

Monitoring and control requirement definition study for dispersed storage and generation (DSG). Final report, Volume I, 7:5601 (NYSERDA 80-15-Vol.1)

Monitoring and control requirement definition study for dispersed storage generation (DSG). Volume III. Appendix B, 7:5602 (NYSERDA 80-15-Vol.3)

DISTRICT HEATING

Coordinated Research Programs

Rational use of energy helps saving. Waste heat from industrial processes and refuse destruction, 7:5418

Optimization

Optimal dimensioning of district heating networks, 7:5419

Waste Heat Utilization

Waste heat and chill storage in aquifer systems, 7:5416 (PNL-SA-9164)

DORMITORIES

See RESIDENTIAL BUILDINGS

DOUBLE ENVELOPE BUILDINGS

Electric Heating

Electric coheating experiment to determine the heat-loss coefficient of a double envelope house, 7:5631 (SERI/TP-721-1316)

Heat Losses

Electric coheating experiment to determine the heat-loss coefficient of a double-envelope house, 7:5631 (SERI/TP-721-1316)

DOUBLET 3 DEVICES

See DOUBLET REACTORS

DOUBLET REACTORS

Data Base Management

Data management in a fusion energy research experiment, 7:5386 (GA-A 16272)

DUAL-PURPOSE POWER PLANTS

Computerized Simulation

Oasis code application to proposed Argonne National Laboratory cogeneration plant, 7:5411 (ANL/CNSV-TM-67)

Economic Analysis

Analysis of potential cogeneration impacts on electricity generation by the Central Maine Power Company, 7:5564 (ANL/CNSV-TM-76)

Feasibility Studies

Analysis of potential cogeneration impacts on electricity generation by the Central Maine Power Company, 7:5564 (ANL/CNSV-TM-76)

Financing

Outside investors spark growth of cogeneration, 7:5417

E

EARS

See AUDITORY ORGANS

EARTH-COVERED BUILDINGS

Passive Solar Cooling Systems

Passive cooling and heating program at Oak Ridge National Laboratory for FY-1981, 7:5640 (CONF-810832-5)

Passive Solar Heating Systems

Passive cooling and heating program at Oak Ridge National Laboratory for FY-1981, 7:5640 (CONF-810832-5)

EAST FACILITY

Design

Residual-energy-applications program: EAST-facility requirements document, 7:5414 (DOE/ET/12866-8-Vol.2)

Residual-energy-application program: EAST-facility requirements document, 7:5413 (DOE/ET/12866-8-Vol.1)

Environmental Impacts

Residual-Energy-Applications Program environmental analysis report, 7:5327 (DOE/ET/12866-5)

Site Selection

Residual-Energy-Applications Program environmental analysis report, 7:5327 (DOE/ET/12866-5)

Specifications

Residual-energy-applications program: EAST-facility requirements document, 7:5414 (DOE/ET/12866-8-Vol.2)

Residual-energy-application program: EAST-facility requirements document, 7:5413 (DOE/ET/12866-8-Vol.1)

ECONOMIC DEVELOPMENT

See also COMMERCIAL SECTOR
COMMERCIALIZATION

Appropriate Technology

Introduction: energy and the future of nations (Book chapter), 7:5474

Energy Source Development

Brazil (Book chapter), 7:5479

People's Republic of China (Book chapter), 7:5478

Mathematical Models

Project impact analysis as an optimal control problem, 7:5289 (BNL-29881)

Political Aspects

Issues in indigenous research and development in Third World countries, 7:5313

Power Demand

More power, less pollution, 7:5610

Recommendations

Energy, environment, and new communities in hot-arid areas of the Middle East, 7:5321

Sociology

Mankind at the starting point, 7:5311

ECONOMIC ELASTICITY

Comparative Evaluations

Refinery mix in the US, Canada, and the EEC, 7:5523

ECONOMIC GROWTH

Energy Consumption

Soviet Union (Book chapter), 7:5476

Energy Demand

Models as a help in energy policy decisions, 7:5487

ECONOMIC IMPACT

Mathematical Models

Project impact analysis as an optimal control problem, 7:5289 (BNL-29881)

ECONOMIC POLICY

Decision Making

Microeconomic decision-making in an unstable macroeconomic environment, 7:5297 (NP-22596)

ECONOMY

Stability

Next great depression II: the impending financial collapse, 7:5310

EDUCATIONAL TOOLS

Evaluation

Comparative study of the impacts of Energy and Man's Environment upon fifth-grade students, 7:5276

EIIP

See ENERGY PARKS

INDUSTRIAL PARKS

ELASTICITY (ECONOMIC)See *ECONOMIC ELASTICITY***ELDERLY PEOPLE****Energy Demand**

Alternative energy forms and the aged, 7:5307

ELECTRIC BATTERIES

(Devices for production and/or storage of electrical energy from chemical reactions; excludes FUEL CELLS and RADIOISOTOPE BATTERIES.)

Research Programs

Status of the DOE battery and electrochemical technology program II, 7:5377 (DOE/ET/25407-1)

Technology Assessment

Status of the DOE battery and electrochemical technology program II, 7:5377 (DOE/ET/25407-1)

ELECTRIC POWERSee also *HYDROELECTRIC POWER***Cost**

Empirical investigation of the rural cooperatives residential demand for electricity, 7:5565 (CONF-810744-1)

Energy Management

Electrical power management in industry, 7:5441

Investment

Order-delivery lag in electricity investment, 7:5611

Peak-Load Pricing

Peak load pricing lowers generation costs, 7:5617

Power Supplies

New York Power Pool, 7:5563

Quality of Life

More power, less pollution, 7:5610

Rate Structure

Power and transmission-rate orders and related documents.

Office of power marketing coordination: data compiled through December 1979, 7:5567 (DOE/CE-0007)

Regulations

Power and transmission-rate orders and related documents.

Office of power marketing coordination: data compiled through December 1979, 7:5567 (DOE/CE-0007)

Socio-Economic Factors

Rural electrification and fertility change in the southern Philippines, 7:5623

Time-of-Use Pricing

Cost-based rates (Four methods of time-differentiated accounting costs), 7:5577 (NP-22596)

ELECTRIC POWER INDUSTRY**Management**

Measuring technological bias, 7:5492

ELECTRIC UTILITIES**Cogeneration**

California cogeneration and small-power-production pricing study, 7:5412 (DOE/CE/10328-1)

Competition

Public-utility participation in decentralized power production, 7:5613

Decision Making

Order-delivery lag in electricity investment, 7:5611

Deregulation

Reaganites, with OMB's list in hand, take dead aim at EPA's regulations, 7:5470

Dispersed Storage and Generation

Monitoring and control requirement definition study for dispersed storage and generation (DSG). Final report, Volume I, 7:5601 (NYSERDA-80-15-Vol.1)

Monitoring and control requirement definition study for dispersed storage generation (DSG). Volume III. Appendix B, 7:5602 (NYSERDA-80-15-Vol.3)

Dual-Purpose Power Plants

Analysis of potential cogeneration impacts on electricity generation by the Central Maine Power Company, 7:5564 (ANL/CNSV-TM-76)

Economics

Long-term outlook for the electric-power business, 7:5599 (NP-22596)

Microeconomic decision-making in an unstable macroeconomic environment, 7:5297 (NP-22596)

Energy Conservation

Movement toward conservation, 7:5572

Energy Efficiency

Energy efficiency and the utilities: new directions (Symposium proceedings), 7:5605

Financing

International financing by electric utilities, 7:5619

Forecasting

Long-term outlook for the electric-power business, 7:5599 (NP-22596)

Fuel Substitution

Acid rain fallout threatens subsidies for utilities that convert to coal, 7:5490

Movement toward conservation, 7:5572

Income

Locally-owned utilities see margins plummet; but revenues up appreciably, 7:5607

Investment

Order-delivery lag in electricity investment, 7:5611

Load AnalysisLoad research (Rationale and insights), 7:5580 (NP-22596)
Load research (Programs at Los Angeles Dept. of Water and Power), 7:5581 (NP-22596)

Load research (Program at Wisconsin Electric Power Co.), 7:5582 (NP-22596)

Load research (Uses at Middle South Services, Inc.), 7:5583 (NP-22596)

Load Management

Customer attitudes (Surveys by Elrick and Lavidge, Inc.), 7:5588 (NP-22596)

Demand control: a cost-effective approach, 7:5612

Electric-Utility Rate-Design Study: proceedings of the rate-design-study regional conferences, 7:5575 (NP-22596)

Equipment for load management, 7:5584 (NP-22596)

Load control (Experiences at Arizona Public Service Co.), 7:5585 (NP-22596)

Load control at Detroit Edison, 7:5586 (NP-22596)

Load management and controls (NEESPAN at New

England Power Service Co.), 7:5587 (NP-22596)

Load-management evaluation (Use of integrative analysis), 7:5591 (NP-22596)

Load-management application and evaluation (Decision making and cost-benefit analysis), 7:5592 (NP-22596)

Load management (Planning and programs at S. California Edison Co.), 7:5593 (NP-22596)

Load management (As practiced at Dayton Power and Light Co.), 7:5594 (NP-22596)

Load management (Review of Virginia Electric and Power Co. activities), 7:5595 (NP-22596)

Load-management evaluation (From regulatory point of view; California PUC), 7:5596 (NP-22596)

Load management (What to do/what not to do; Michigan PSC), 7:5597 (NP-22596)

Load management (Approaches and regulatory goals; New York PSC), 7:5598 (NP-22596)

Movement toward conservation, 7:5572

Management

Electric generation expansion analysis system. A progress report on Pri 1529, 7:5604 (PB-81-119778)

Performance

Efficiency measurement in the regulated sector: an empirical study of the Massachusetts electric utility industry employing the Williamson expense-preference theory in a pooled regression model, 7:5615

Power Demand

Analysis of potential cogeneration impacts on electricity generation by the Central Maine Power Company, 7:5564 (ANL/CNSV-TM-76)

Rate Structure

Cost and rates, 7:5576 (NP-22596)

Cost and rates: marginal cost, 7:5578 (NP-22596)

Cost and rates (Recommendations for cost-based rates), 7:5579 (NP-22596)

Cost-based rates (Four methods of time-differentiated accounting costs), 7:5577 (NP-22596)

Customer response (At Pacific Gas and Electric Co.), 7:5590 (NP-22596)

Electric-Utility Rate-Design Study: proceedings of the rate-design-study regional conferences, 7:5575 (NP-22596)

Electricity pricing and national energy policy, 7:5621
Peak load pricing lowers generation costs, 7:5617
Progress with PURPA: the activities of Pacific Gas and Electric Company in meeting the requirements of Section 133 of the Public Utility Regulatory Policies Act of 1978, 7:5622

Ratemaking: the problem now is the art, 7:5606

Regulations

Public utility regulation and the decade ahead, 7:5620
Regulation and the electric utility industry, 7:5600 (NP... 22596)

Solar Energy

Financing solar energy: state policy options, 7:5683

Systems Analysis

Public-utility participation in decentralized power production, 7:5613

Time-of-Use Pricing

Customer response (At Pacific Gas and Electric Co.), 7:5590 (NP... 22596)

Time-of-use rate studies with residential customers (By Research Triangle Inst.), 7:5589 (NP... 22596)

ELECTRICITY

Cost

Progress with PURPA: the activities of Pacific Gas and Electric Company in meeting the requirements of Section 133 of the Public Utility Regulatory Policies Act of 1978, 7:5622

Prices

Electricity pricing and national energy policy, 7:5621
Progress with PURPA: the activities of Pacific Gas and Electric Company in meeting the requirements of Section 133 of the Public Utility Regulatory Policies Act of 1978, 7:5622
Public utility regulation and the decade ahead, 7:5620

ELECTRIC-POWERED VEHICLES

See also RAILROADS/POWERED RAIL VEHICLES

Economics

Future of electricity for anti-autobuses: advanced electric vehicle concepts, 7:5431 (E.C.R.I.—85526)

Technology Assessment

Future of electricity for anti-autobuses: advanced electric vehicle concepts, 7:5431 (E.C.R.I.—85526)

ELEMENTS

See also MIXTURES

Energy

On the concept of standard energy, 7:5285

EMPLOYMENT

Training

Meeting the solar energy industry's labor needs, 7:5685

END-USE SECTOR

See COMMENTS/END-USE SECTOR INDUSTRY

ENERGY

See also CATHODIC TUBES/ENERGY
NUCLEAR/ENERGY
SOLAR/ENERGY

Energy, environment, and new communities in hot arid areas of the Middle East, 7:5521

Education

Comparative study of the impacts of Energy and Man's Environment upon fifth grade students, 7:5276

Prices

Rising energy prices: what's good for some states is bad for others, 7:5286

ENERGY ANALYSIS

Computer Codes

Comparative study of four building energy simulations: Phase II; DOE-2.1, BLAST-3D, SUNCAL-2.4, and DEROB-4, 7:5671 (SERI/TP... 7211326)
Ultimate in building energy analysis: DOE-2 and BLAST, 7:5278 (I.A.U.R.—81-2288)

ENERGY COMPLEXES

See ENERGY PARKS

ENERGY CONSERVATION

Movement toward conservation (Survey of utility efforts), 7:5572

Role of local government in energy policy (Book chapter), 7:5485

Economics

Economics of solar energy and conservation systems. Volume III. Energy management and conservation (Book), 7:5439

Energy Policy

Energy plan: prices to spur conservation, 7:5434

Financial Assistance

Grants, costs spur hospital energy-conservation efforts, 7:5433

Information Dissemination

Seminars for private college administrators on solar applications for college buildings, 7:5663 (MASEC-CF—81-038)

Public Policy

Energy for America (Book), 7:5687

Research Programs

Program summary, 7:5430 (TVA/OP/ECR—81-19)

Retailers

Retail battle for conservation dollars, 7:5437

Social Impact

Balanced urban ground-passenger transportation with respect to energy, demand, and income: an approach for bus-transit supply-system planning, 7:5443

Standards

Who will set the standards for groups that set industry product standards, 7:5438

ENERGY CONSUMPTION

Bibliographies

Fuel consumption: industrial, residential, and general studies. 1977-October 1980 (citations from the NTIS data base). Report for 1977-October 1980 (Bibliographies), 7:5630 (PB—81-800369)

Data Acquisition

National Interim Energy-Consumption Survey. Part I.

Household and utility-company surveys, 7:5624 (DOE/EIA/10085—T1(Pt.1))

National Interim Energy-Consumption Survey. Part II.

Household and utility-company surveys. Appendix A, 7:5625 (DOE/EIA/10085—T1(Pt.2))

National Interim Energy-Consumption Survey. Part III.

Household and utility-company surveys. Appendices B through G, 7:5626 (DOE/EIA/10085—T1(Pt.3))

Economic Impact

Introduction: energy and the future of nations (Book chapter), 7:5474

Environmental Impacts

Japan (Book chapter), 7:5477

Global Aspects

World Energy: the facts and the future (Book), 7:5450

Quality of Life

United States (Book chapter), 7:5475

Surveys

National Interim Energy-Consumption Survey. Part I.

Household and utility-company surveys, 7:5624 (DOE/EIA/10085—T1(Pt.1))

National Interim Energy-Consumption Survey. Part II.

Household and utility-company surveys. Appendix A, 7:5625 (DOE/EIA/10085—T1(Pt.2))

National Interim Energy-Consumption Survey. Part III.

Household and utility-company surveys. Appendices B through G, 7:5626 (DOE/EIA/10085—T1(Pt.3))

ENERGY CONVERSION

See also SOLAR ENERGY CONVERSION

Computerized Simulation

OESYS: a simulation tool for non-conventional energy applications analysis. Theoretical and operational description with user documentation, 7:5573 (MIT-EL—80-022)

Economic Analysis

OESYS: a simulation tool for non-conventional energy applications analysis. Theoretical and operational description with user documentation, 7:5573 (MIT-EL—80-022)

ENERGY DEMAND

Data Compilation

Energy end-use requirements in manufacturing, 7:5635 (SERI/TR—733-79OR(Vol.3))

Energy end-use requirements in manufacturing, 7:5634 (SERI/TR—733-79OR(Vol.2))

- Economic Elasticity**
Fuel choice and aggregate energy demand in the residential and commercial sectors, 7:5456
- Economic Growth**
Models as a help in energy policy decisions, 7:5487
- Energy Models**
Energy end-use requirements in manufacturing, 7:5633 (SERI/TR—733-79OR(Vol.1))
- Forecasting**
Energy end-use requirements in manufacturing, 7:5633 (SERI/TR—733-79OR(Vol.1))
Energy end-use requirements in manufacturing, 7:5635 (SERI/TR—733-79OR(Vol.3))
Energy in a finite world: executive summary (Booklet), 7:5452
Gas demand in severe weather: aspects of forecasting and planning, 7:5532
Models for forecasting energy use in the US farm sector. Volume 2. Final report, 7:5277 (EPRI-EA—1956-Vol.2)
- Socio-Economic Factors**
Alternative energy forms and the aged, 7:5307
- Systems Analysis**
Energy in a finite world: a global systems analysis (Book; study of IASIA Energy Systems Program Group), 7:5454
- ENERGY EFFICIENCY**
Energy efficiency and the utilities: new directions (Symposium proceedings), 7:5605
- Energy Policy**
Energy policy: DOs and DON'Ts for the 1980s, 7:5488
- Equipment**
Energy savers: some work, some don't, some are just plain gyms, 7:5432
- Evaluation**
Second-law analysis: an alternative indicator of system efficiency, 7:5283
- Financial Incentives**
Upgrading energy efficiency requires tax incentives, 7:5436
- Market**
Retail battle for conservation dollars, 7:5437
- ENERGY EFFICIENCY STANDARDS**
Testing
Sampling design for the 1980 commercial and multifamily residential building survey, 7:5429 (PNL—3883)
- ENERGY FACILITIES**
See also RESOURCE RECOVERY FACILITIES
- Environmental Impacts**
Land use and energy, 7:5324 (ANL/AA—19)
- Land Requirements**
Land use and energy, 7:5324 (ANL/AA—19)
- Site Selection**
Economics of permitting: an approach, 7:5318
EPA's emission offset policy and energy facility siting, 7:5354
Policies for energy facility siting on the urban coast, 7:5320
Refining the waterfront. Alternative energy facility siting policies for urban coastal areas, 7:5314
Urban waterfront: planning perspectives and energy facility siting, 7:5317
- ENERGY INTEGRATED INDUSTRIAL PARKS**
See ENERGY PARKS
INDUSTRIAL PARKS
- ENERGY MANAGEMENT**
Economics of solar energy and conservation systems. Volume III. Energy management and conservation (Book), 7:5439
- Bibliographies**
Analytical and policy issues in energy economics: selected bibliography, 7:5272 (DOE/EIA/10752—T2)
- ENERGY MODELS**
Models as a help in energy policy decisions, 7:5487
Models for forecasting energy use in the US farm sector. Volume 2. Final report, 7:5277 (EPRI-EA—1956-Vol.2)
- Linear Programming**
Modelling energy-economic interactions in developing countries: a linear-programming approach, 7:5288 (BNL—29747)
- ENERGY PARKS**
Earth-Covered Buildings
Earth-sheltered industrial utility park. Final report, 7:5423 (DOE/R5/10248—T1)

ENERGY POLICY

See also NATIONAL ENERGY PLAN

- Access rights for the solar user: in search of the best statutory approach, 7:5486
- CCE energy statement and its application to Pennsylvania, 7:5273
- Energy: elusive solutions, 7:5284
- Energy crises in historical perspective, 7:5529
- Energy forecast: partial clearing, 7:5471
- Energy policy: DOs and DON'Ts for the 1980s, 7:5488
- Models as a help in energy policy decisions, 7:5487
- Role of local government in energy policy (Book chapter), 7:5485
- Bibliographies**
Analytical and policy issues in energy economics: selected bibliography, 7:5272 (DOE/EIA/10752—T2)
- Computer Codes**
Models for national energy policy analysis and planning, 7:5457
- Decision Making**
Role of large scale energy systems models in R and D planning, 7:5376 (BNL—29751)
United States (Book chapter), 7:5475
- Economic Impact**
World Energy: the facts and the future (Book), 7:5450
- Economics**
On energy policy, the administration prefers to duck, defer, and deliberate, 7:5465
- Energy Conservation**
Energy plan: prices to spur conservation, 7:5434
- Environmental Impacts**
Energy: why planners must be involved, 7:5472
Institutional constraints upon environmentally sound energy policy (Book chapter), 7:5449
- Ethics**
Nuclear genie: beyond Faust, fate, and incantations, 7:5403
- Global Aspects**
Introduction: energy and the future of nations (Book chapter), 7:5474
National energy profiles (Booklet), 7:5473
Oil diplomacy: the Atlantic nations in the oil crisis of 1978-79 (Booklet), 7:5550
- Legislation**
Congress and national energy policy: assessing the policymaking process (Book chapter), 7:5484
- Meetings**
Environment, energy, public policy: toward a rational future (Book; conference proceedings), 7:5444
- Planning**
New York State energy master plan and long range electric and gas report. Volume 1. Executive summary. Final report, 7:5460 (PB—81-118028)
New York State energy master plan and long range electric and gas report. Volume 2. Appendixes. Final report, 7:5461 (PB—81-118036)
New York State energy master plan and long range electric and gas report. Volume 3. Final report, 7:5462 (PB—81-118044)
- Political Aspects**
Energy and the environment: conflict and resolution (Book chapter), 7:5345
- Public Opinion**
Disincentives for policy leadership in energy and the environment: the structure of voter opinion (Book chapter), 7:5346
- Risk Assessment**
Nuclear genie: beyond Faust, fate, and incantations, 7:5403
- Social Impact**
World Energy: the facts and the future (Book), 7:5450
- Socio-Economic Factors**
Energy: why planners must be involved, 7:5472
Natural gas pricing: policy and impact on the local community, 7:5542
- ENERGY SHORTAGES**
Energy: elusive solutions, 7:5284
- Computer Codes**
Macroeconomics and oil-supply disruptions, 7:5502 (DOE/PE/70278—T17)

Economic Impact

Guidebook for analysis of state-level economic impacts of an energy shortfall, 7:5447 (ANI /CNSV-TM—70)

Energy Policy

Energy crises in historical perspective, 7:5529

Government Policies

Macroeconomics and oil-supply disruptions, 7:5502 (DOE/PI/70278 T17)

Simulation

Macroeconomics and oil-supply disruptions, 7:5502 (DOE/PI/70278 T17)

ENERGY SOURCE DEVELOPMENT**Economic Analysis**

Cost comparison of energy projects: discounted cash flow and revenue-requirement methods, 7:5309

Economic Development

Mexico (Book chapter), 7:5480

Economic Impact

Energy development in the western United States: impact on rural areas (Book), 7:5322

Long-range assessment of R & D policy for gas-related conversion technologies and unconventional natural gas resources, 7:5494 (BNL 51208)

Energy Models

Long-range assessment of R & D policy for gas-related conversion technologies and unconventional natural gas resources, 7:5494 (BNL 51208)

Energy Policy

Energy policy: DOs and DON'Ts for the 1980s, 7:5488

Environmental Impacts

Brazil (Book chapter), 7:5479

Disincentives for policy leadership in energy and the environment: the structure of voter opinion (Book chapter), 7:5346

Environmental trends to the year 2000, 7:5326 (DOE/EP-0021)

Land use and energy, 7:5324 (ANI /AA 19)

Notes from no man's land: the politics and ecology of energy research and development, 7:5447

People's Republic of China (Book chapter), 7:5478

Government Policies

Mexico (Book chapter), 7:5480

Land Requirements

Land use and energy, 7:5324 (ANI /AA 19)

Optimization

Extraction timing and economic incentives for geothermal reservoir management, 7:5625

Planning

Energy: why planners must be involved, 7:5477

Political Aspects

Nigeria (Book chapter), 7:5481

Notes from no man's land: the politics and ecology of energy research and development, 7:5447

Public Opinion

Disincentives for policy leadership in energy and the environment: the structure of voter opinion (Book chapter), 7:5346

Public Policy

Energy for America (Book), 7:5487

Recommendations

Alternative energy technologies: blueprint for the future, 7:5453

Research Programs

Role of large scale energy systems models in R and D planning, 7:5376 (BNL 29751)

Social Impact

Energy development in the western United States: impact on rural areas (Book), 7:5322

Socio-Economic Factors

Taiwan (Book chapter), 7:5482

Taxes

Effective tax planning for Mexican operations, 7:5519

Taxation of United States investment in oil and gas exploration, development, and production in selected countries, 7:5302

Water Requirements

Environmental trends to the year 2000, 7:5326 (DOE/EP-0021)

ENERGY SOURCES

See also *RENEWABLE ENERGY SOURCES*

WIND POWER

WOOD FUELS

Research Programs

Notes from no man's land: the politics and ecology of energy research and development, 7:5447

ENERGY SUPPLIES

See also *FUEL SUPPLIES*

Availability

General problems of the world fuel-energy situation (on the basis of the 11th World Energy Conference), 7:5449

Demand Factors

Fuel consumption: industrial, residential, and general studies. 1977-October 1980 (citations from the NTIS data base). Report for 1977-October 1980 (Bibliographies), 7:5630 (PB—81-800369)

Economics

Energy and the future: a crossroads for the world, 7:5555

Energy Policy

On energy policy, the administration prefers to duck, defer, and deliberate, 7:5465

Forecasting

Energy in a finite world: executive summary (Booklet), 7:5452
Role of large scale energy systems models in R and D planning, 7:5376 (BNL—29751)

World oil and coal reality (Supply conforms to producer logic), 7:5540

Global Aspects

Coal's participation in world energy supplies, 7:5554
International business conference: world energy outlook, 7:5551

World Energy: the facts and the future (Book), 7:5450

International Cooperation

Politics, plutonium, and energy interdependence, 7:5389

Meetings

International business conference: world energy outlook, 7:5551

National Security

US energy self-reliance will ensure national security, 7:5464

Political Aspects

Energy and the future: a crossroads for the world, 7:5555

Recommendations

Alternative energy technologies: blueprint for the future, 7:5453

Systems Analysis

Energy in a finite world: a global systems analysis (Book; study of IASA Energy Systems Program Group), 7:5454

ENERGY SYSTEMS**Economic Analysis**

Cost comparison of energy projects: discounted cash flow and revenue-requirement methods, 7:5309

Economic Impact

Modelling energy-economic interactions in developing countries: a linear-programming approach, 7:5288 (BNL—29747)

Efficiency

Second-law analysis: an alternative indicator of system efficiency, 7:5283

ENGLAND

See *UNITED KINGDOM*

ENHANCED RECOVERY**Operating Cost**

Costs and indexes for domestic oil and gas field equipment and production operations, 1980, 7:5496 (DOE/EIA—0185-80)

ENVIRONMENT

Energy, environment, and new communities in hot-arid areas of the Middle East, 7:5321

Regulation of the transportation of hazardous materials: a critique and a proposal, 7:5342

Forecasting

Environmental trends to the year 2000, 7:5326 (DOE/EP—0021)

Interest Groups

Investigation into environmental activism, 7:5325

Pollution Control

Environmental quality and residuals management, 7:5323

Regulations

Reaganites, with OMB's list in hand, take dead aim at EPA's regulations, 7:5470

ENVIRONMENTAL IMPACT STATEMENTS

Manuals

Handbook of variables for environmental impact assessment, 7:5356

ENVIRONMENTAL IMPACTS

Economics

Separability, functional structure, and aggregation for a class of models in environmental economics, 7:5336

ENVIRONMENTAL POLICY

Institutional constraints upon environmentally sound energy policy (Book chapter), 7:5349

Markets in air: problems and prospects of controlled trading, 7:5343

International Cooperation

Making pollution prevention pay (Includes Bibliography of No-Waste Technology), 7:5328

Meetings

Environment, energy, public policy: toward a rational future (Book; conference proceedings), 7:5344

Political Aspects

Energy and the environment: conflict and resolution (Book chapter), 7:5345

Public Opinion

Disincentives for policy leadership in energy and the environment: the structure of voter opinion (Book chapter), 7:5346

EUR

See ENHANCED RECOVERY

EQUIPMENT

See also MILITARY EQUIPMENT
THERMAL ENERGY STORAGE EQUIPMENT

Cost

Costs and indexes for domestic oil and gas field equipment and production operations, 1980, 7:5496 (DOE/EIA—0185-80)

ETHANOL FUELS

Economic Impact

Individual biomass facility reports supplement to some employment and earnings implications of regional biomass energy utilization: New England and the cornbelt states, 7:5664 (ORAU—181B)

Land Use

Impact of increased alcohol production on agriculture: a simulation study, 7:5361

EUROPE

See also FEDERAL REPUBLIC OF GERMANY
FRANCE
UNITED KINGDOM
USSR

Natural Gas

European natural gas: exploration urged as alternative to Siberian pipeline, 7:5517

Nuclear Weapons

Nuclear threat: can Europe build a common defense, 7:5399

EUROPEAN COMMUNITIES

Energy Policy

European view of energy problems, 7:5558

EXERGY

Calculation Methods

On the concept of standard energy, 7:5285

Economics

Exergy economics, 7:5282

EXHAUST GASES

Deregulation

Reaganites, with OMB's list in hand, take dead aim at EPA's regulations, 7:5470

EXPLORATION

Institutional Factors

Intergovernmental restraints on oil and gas developments, 7:5538

EXPORTS

International Cooperation

Influence of trade and commercial barriers on the industrial processing of natural resources, 7:5303

F

FACILITIES (ENERGY)

See ENERGY FACILITIES

FACILITIES (MILITARY)

See MILITARY FACILITIES

FACILITIES (NUCLEAR)

See NUCLEAR FACILITIES

FACILITIES (RESOURCE RECOVERY)

See RESOURCE RECOVERY FACILITIES

FARMS

Energy Demand

Models for forecasting energy use in the US farm sector. Volume 2. Final report, 7:5277 (E-PRI-FA—1956-Vol2)

FEDERAL REPUBLIC OF GERMANY

Energy Policy

Activities of the inquiry commission on the future nuclear policy. Findings and discussion, 7:5404

Energy Supplies

Coal and nuclear energy: A basis for a secure energy supply, 7:5380

Expected future development of nuclear energy until the year 2000, 7:5401

Nuclear Energy

Energy inquiry of the West German Parliament. 4 ways into the future, 7:5394

Power Demand

Coal and nuclear energy: A basis for a secure energy supply, 7:5380

FINANCING

International Agreements

International financing by electric utilities, 7:5619

FINGERPRINTING (OIL SPIILLS)

See OIL SPIILLS

FIRE STATIONS

See PUBLIC BUILDINGS

FIRE DAMP

See MATHIAS

FIREWOOD

See WOOD FIRES

FISSIONABLE MATERIALS MANAGEMENT

See NUCLEAR MATERIALS MANAGEMENT

FLY ASH

Environmental Impacts

Coal burning power (Book—monographs), 7:5505

FOOD

Containers

Economic analysis of the feasibility of the rebot pouch for packaging fruit and vegetable commodities in an environment of rising energy prices, 7:5442

FOOD INDUSTRY

Energy Efficiency

Economic analysis of the feasibility of the rebot pouch for packaging fruit and vegetable commodities in an environment of rising energy prices, 7:5442

Energy Expenses

Economic analysis of the feasibility of the rebot pouch for packaging fruit and vegetable commodities in an environment of rising energy prices, 7:5442

FORESTS

Planning

Institutional limits to national public planning for forest resources: the Resources Planning Act, 7:5365

Resource Development

Nation's ailing timber industry finds it has a friend in Washington, 7:5363

FORMOSA

See TAIWAN

FOSSIL-FUEL POWER PLANTS

See also ELECTRIC UTILITIES

Computerized Simulation

Detroit Edison reveals coal evaluation technique: reaps plant savings, 7:5609

Environmental Impacts

Energy-environmental trade-offs in the courts: nuclear and fossil fuels (Book chapter), 7:5348

Fuel Substitution

Financial ability of electric utilities to undertake oil-displacement programs, 7:5569 (DOE/PE/70278—T16)

Legislation

Energy-environmental trade-offs in the courts: nuclear and fossil fuels (Book chapter), 7:5348

Retrofitting

Financial ability of electric utilities to undertake oil-displacement programs, 7:5569 (DOE/PE/70278—T16)

FRANCE**Energy Supplies**

Expected future development of nuclear energy until the year 2000, 7:5401

FUEL ADDITIVES**Deregulation**

Reaganites, with OMB's list in hand, take dead aim at EPA's regulations, 7:5470

FUEL CONSUMPTION**Mathematical Models**

Fuel choice and aggregate energy demand in the residential and commercial sectors, 7:5456

Surveys

National Interim Energy-Consumption Survey. Part III. Household and utility-company surveys. Appendices B through G, 7:5626 (DOE/EIA/10085—T1(Pt.3))
National Interim Energy-Consumption Survey. Part IV. Transportation panel. Including Appendices A through C, 7:5627 (DOE/EIA/10085—T1(Pt.4))
National Interim Energy-Consumption Survey. Part V. Transportation panel. Appendices D through H, 7:5628 (DOE/EIA/10085—T1(Pt.5))

FUEL COOLING INSTALLATIONS

See SPENT FUEL STORAGE

FUEL GAS**Energy Source Development**

Long-range assessment of R & D policy for gas-related conversion technologies and unconventional natural gas resources, 7:5494 (BNI—51208)

FUEL OILS**Prices**

New oil contract escalator seen cutting NYC fuel bills, 7:5515

FUEL SLURRIES**Mixing**

Coal-oil mixtures: an alternative fuel for the commercial markets and large residential markets, 7:5493 (BNI—29773)

Physical Properties

Coal-oil mixtures: an alternative fuel for the commercial markets and large residential markets, 7:5493 (BNI—29773)

Storage

Coal-oil mixtures: an alternative fuel for the commercial markets and large residential markets, 7:5493 (BNI—29773)

FUEL SUBSTITUTION

Acid rain fallout threatens subsidies for utilities that convert to coal, 7:5490

Decision Making

All the easy questions have been answered, 7:5543

Energy Policy

Alternative energy technologies: blueprint for the future, 7:5453

Financial Incentives

Financial ability of electric utilities to undertake oil-displacement programs, 7:5569 (DOE/PE/70278—T16)

Legal Aspects

Financial ability of electric utilities to undertake oil-displacement programs, 7:5569 (DOE/PE/70278—T16)

Metals

Powdered metals as fuels, 7:5686

FUEL SUPPLIES**Political Aspects**

Figuring on energy: politics of drawdown, 7:5516

Wood Wastes

Evaluating feedstock requirements for a 50-megawatt wood-fired electric-generating unit, 7:5681

FUELS

See also BOILER FUELS
DIESEL FUELS
FUEL GAS

FUEL OILS
FUEL SLURRIES
GASOHOL
GASOLINE
REFUSE DERIVED FUELS
SYNTHETIC FUELS
WOOD FUELS

Deregulation

Reaganites, with OMB's list in hand, take dead aim at EPA's regulations, 7:5470

Prices

Analysis of the recycling coefficients of non-ferrous metals in the US economy, 1959-1976, 7:5369
Fuel choice and aggregate energy demand in the residential and commercial sectors, 7:5456

FUELWOOD

See WOOD FUELS

FURNACES**Design**

Development of a biomass energy system for drying corn. Final report, 1 July 1978-30 June 1981, 7:5421 (DOE/CS/40059—T1)

Fabrication

Development of a biomass energy system for drying corn. Final report, 1 July 1978-30 June 1981, 7:5421 (DOE/CS/40059—T1)

G**GAS UTILITIES****Rate Structure**

Incremental pricing, 7:5545

Natural gas rate design in Wisconsin, 7:5546

Standby or supplemental rates, 7:5548

Trends and issues in retail rate design: the Montana experience or the Montana Power Company experience, 7:5547

Regulations

Public utility regulation and the decade ahead, 7:5620

GASOHOL**Consumption Rates**

National Interim Energy-Consumption Survey. Part IV. Transportation panel. Including Appendices A through C, 7:5627 (DOE/EIA/10085—T1(Pt.4))

National Interim Energy-Consumption Survey. Part V. Transportation panel. Appendices D through H, 7:5628 (DOE/EIA/10085—T1(Pt.5))

Energy Policy

Onshol, economics, and passenger-transportation policy, 7:5561

Environmental Impacts

Near-term goals for alcohol fuels from biomass: an overview of resource requirements, land use, environmental, and socioeconomic impacts, 7:5638 (ANL/EES-TM—149)

Socio-Economic Factors

Near-term goals for alcohol fuels from biomass: an overview of resource requirements, land use, environmental, and socioeconomic impacts, 7:5638 (ANL/EES-TM—149)

GASOLINE**Allocations**

Administration of the state fuels set-aside. Annual report to the Legislature, 7:5512 (P—150-81-001)

Consumption Rates

National Interim Energy-Consumption Survey. Part IV. Transportation panel. Including Appendices A through C, 7:5627 (DOE/EIA/10085—T1(Pt.4))

National Interim Energy-Consumption Survey. Part V. Transportation panel. Appendices D through H, 7:5628 (DOE/EIA/10085—T1(Pt.5))

Demand

Temporal cross-section specification of the demand for gasoline using a random-coefficient regression model, 7:5455

Prices

Higher prices or gasoline lines loom if Iran-Iraq war lasts into spring, 7:5275

GEORGIA

Legislation

Case studies in state solar legislation, 7:5467

GEOTHERMAL ENERGY

Attitudes

Measurement of attitudes toward commercial development of geothermal energy in Federal Region IX. Final report, 7:5658 (DOE/SF/10854—T1)

Commercialization

Measurement of attitudes toward commercial development of geothermal energy in Federal Region IX. Final report, 7:5658 (DOE/SF/10854—T1)

Feasibility Studies

Japan's unique energy situation, 7:5489

GEOTHERMAL FIELDS

Energy Source Development

Extraction timing and economic incentives for geothermal reservoir management, 7:5675

GEOTHERMAL HEATING SYSTEMS

Commercialization

Geothermal energy: a viable energy source for health facilities, 7:5678

GEOTHERMAL INDUSTRY

Surveys

Measurement of attitudes toward commercial development of geothermal energy in Federal Region IX. Final report, 7:5658 (DOE/SF/10854—T1)

GEOTHERMAL POWER PLANTS

Licensing

Geothermal policy development program: expediting the local geothermal permitting process, 7:5654 (DOE/ET/27194—T4)

Permits

Geothermal policy development program: expediting the local geothermal permitting process, 7:5654 (DOE/ET/27194—T4)

GEOTHERMAL RESOURCES

Exploration

Application of I.R.C. Section 617 to geothermal exploratory costs, 7:5676

Regulations

Application of I.R.C. Section 617 to geothermal exploratory costs, 7:5676

GEOTHERMAL WELLS

Research Programs

Sandia program in geothermal technology development, 7:5666 (SAND—81-1490C)

Taxes

Recapture of intangible drilling and development costs: a discussion of the proposed regulations, 7:5291

GERMANY (FEDERAL REPUBLIC)

See *FEDERAL REPUBLIC OF GERMANY*

GOVERNMENT POLICIES

See also *ECONOMIC POLICY*

ENERGY POLICY

ENVIRONMENTAL POLICY

Environmental Impacts

Shifting sands of Federal barrier-islands policy, 7:5341

Social Impact

Nuclear power risks: challenge to the credibility of science, 7:3355

GREAT BRITAIN

See *UNITED KINGDOM*

GREENHOUSE EFFECT

Information Needs

All the easy questions have been answered, 7:5543

GROUND WATER

Legal Aspects

Recent Developments in Colorado groundwater law, 7:5371

GROUND-WATER RESERVES

See *AQUIFERS*

HARD COAL

See *INDUSTRY*

HARVESTING EQUIPMENT

Optimization

Harvesting of close-spaced short rotation woody biomass, 7:5653 (DOE—E1-2133—12)

HAZARDOUS MATERIALS

Case Law

Regulation of the transportation of hazardous materials: a critique and a proposal, 7:5432

Deregulation

Reganites, with OMB's list in hand, take dead aim at EPA's regulations, 7:5470

Transport

Regulation of the transportation of hazardous materials: a critique and a proposal, 7:5432

HEAT PUMPS

Specifications

Residual-energy applications program: EAST-facility requirements document, 7:5414 (DOE—E1-12866—8-Vol.2)

HEAT STORAGE

Feasibility Studies

Waste heat and chill storage in computer systems, 7:5416 (PNL-SA—9104)

Time-of-Use Pricing

Oil peak storage heating: the British experience, 7:5409

HEATING LOAD

Calculation Methods

Residential energy audits and energy conservation: Part I: general report, 7:5434 (NPL—E1-4310)

HELIOSTATS

Commercialization

Power conversion technology commercialization, 7:5665 (SAND—81-1490C)

HOSPITALS

Energy Conservation

Granting cooperation hospital energy conservation efforts, 7:5433

HOT WATER HEATERS

See *ENERGY CONSUMPTION*

HOUSEHOLDS

Energy Consumption

Domestic energy consumption in India (Pondicherry region), 7:5636

National Interim Energy Consumption Survey: Part I

Household and building energy surveys, 7:5624

(DOE—E1A—10085—T1)(Pt.6)

National Interim Energy Consumption Survey: Part II

Household and building energy surveys: Appendix A, 7:5625

(DOE—E1A—10085—T1)(Pt.6)

National Interim Energy Consumption Survey: Part III

Household and building energy surveys: Appendixes B

through G, 7:5626 (DOE—E1A—10085—T1)(Pt.6)

Heating Load

Residential energy audits and energy conservation: Part I: general report, 7:5434 (NPL—E1-4310)

HOUSES

Air Infiltration

Effect of closed ventilation on house infiltration, 7:5426

(ORNL—CONF—790)

Attached Greenhouses

Attached single and paired solar heated residences: a study of nationwide patterns of economic feasibility for the existing housing stock, 7:5600 (E1A—81-1490C)

Space HVAC Systems

National Interim Energy Consumption Survey: Part VI

Energy assessment, 7:5629 (DOE—E1A—10085—T1)(Pt.6)

Specifications

National Interim Energy Consumption Survey: Part VI

Energy assessment, 7:5629 (DOE—E1A—10085—T1)(Pt.6)

Thermal Insulation

National Interim Energy Consumption Survey: Part VI

Energy assessment, 7:5629 (DOE—E1A—10085—T1)(Pt.6)

Ventilation
Effect of forced ventilation on house infiltration, 7:5426
(ORNL/CON—75)

HUMAN POPULATIONS

Behavior

Reducing consumption in periods of acute scarcity: the case of water, 7:5360

Environmental Impacts

Noise pollution in urban ghettos: assessment, issues and challenges, 7:5351

Transport

Balanced urban ground-passenger transportation with respect to energy, demand, and income: an approach for bus-transit supply-system planning, 7:5443

HYBRID ELECTRIC-POWERED VEHICLES

Economics

Future of electricity for automobiles: advanced electric vehicle concepts, 7:5431 (UCRL 85526)

Technology Assessment

Future of electricity for automobiles: advanced electric vehicle concepts, 7:5431 (UCRL 85526)

HYDROELECTRIC POWER

Conservationists cause hesitation in development of Swedish hydroelectric power, 7:5680

Uses

Potential supply of synthetic fuels from Alaskan hydroelectric power and coal, 7:5560 (BNI 29764)

HYDROELECTRIC POWER PLANTS

See also LOW-HEAD HYDROELECTRIC POWER PLANTS
PUMPED-STORAGE POWER PLANTS

Interfaces

Analysis barriers to improving the hydroelectric power interface with electric power systems. Final report, 7:5603 (PB-81-117244)

Optimization

Analysis barriers to improving the hydroelectric power interface with electric power systems. Final report, 7:5603 (PB-81-117244)

Site Selection

Hydropower sites of the United States developed and undeveloped: river basin maps showing site locations (conventional, pumped storage, retired), 7:5571 (DOE/TIC 1029964)

Water Resources

Hydropower sites of the United States developed and undeveloped: river basin maps showing site locations (conventional, pumped storage, retired), 7:5571 (DOE/TIC 1029964)

HYDROELECTRICITY

See HYDROELECTRIC POWER

HYDROGEN

Systems Analysis

Systems analysis of hydrogen/natural gas supplementation and separation, 7:5559 (BNI 29520)

Uses

Potential supply of synthetic fuels from Alaskan hydroelectric power and coal, 7:5560 (BNI 29764)

HYDROGEN PRODUCTION

Electrolysis

Potential supply of synthetic fuels from Alaskan hydroelectric power and coal, 7:5560 (BNI 29764)

HYDROGEN STORAGE

Iron Hydrides

Hydrogen storage in metal hydrides, 7:5562

Lanthanum Hydrides

Hydrogen storage in metal hydrides, 7:5562

Magnesium Hydrides

Hydrogen storage in metal hydrides, 7:5562

Nickel Hydrides

Hydrogen storage in metal hydrides, 7:5562

Titanium Hydrides

Hydrogen storage in metal hydrides, 7:5562

Vanadium Hydrides

Hydrogen storage in metal hydrides, 7:5562

HYDROTHERMAL SYSTEMS

Energy Source Development

Extraction timing and economic incentives for geothermal reservoir management, 7:5675

IMPORTS

Economic Impact

US energy self-reliance will ensure national security, 7:5464

INCREMENTAL-COST PRICING

Economic Impact

Incremental pricing, 7:5545

INDIA

Energy Consumption

Domestic energy consumption in India (Pondicherry region), 7:5636

Households

Domestic energy consumption in India (Pondicherry region), 7:5636

INDIAN RESERVATIONS

Severance Tax

Tribal severance taxes: outside the purview of the commerce clause, 7:5469

INDUSTRIAL PARKS

Earth-Covered Buildings

Earth-sheltered industrial utility park. Final report, 7:5423 (DOE/R5/10248—T1)

INDUSTRIAL PLANTS

See also COAL GASIFICATION PLANTS
COAL LIQUEFACTION PLANTS
PETROCHEMICAL PLANTS

Cogeneration

Environmental assessment on industrial cogeneration demonstration plant at the Riegel Textile Mill site, Ware Shoals, South Carolina, 7:5415 (DOE/TIC—11486)

Energy Efficiency

Common sense approach to conservation, 7:5444

Waste Heat

Waste heat and chill storage in aquifer systems, 7:5416 (PNL-SA—9164)

INDUSTRIAL SECTOR

See INDUSTRY

INDUSTRIAL WASTES

Transfrontier Pollution

Making pollution prevention pay (Includes Bibliography of No-Waste Technology), 7:5328

INDUSTRIALIZED COUNTRIES

See DEVELOPED COUNTRIES

INDUSTRY

See also COAL INDUSTRY

CONSTRUCTION INDUSTRY
ELECTRIC POWER INDUSTRY
FOOD INDUSTRY
GEOTHERMAL INDUSTRY
METAL INDUSTRY
MINERAL INDUSTRY
NATURAL GAS INDUSTRY
NUCLEAR INDUSTRY
OIL SHALE INDUSTRY
PETROLEUM INDUSTRY
SOLAR INDUSTRY
WOOD PRODUCTS INDUSTRY

Comparative Evaluations

Comparative economics of basic industries in the Arabian Gulf region, 7:5301

Electric Power

Electrical power management in industry, 7:5441

Energy Conservation

Energy plan: prices to spur conservation, 7:5434

Energy Consumption

Japan (Book chapter), 7:5477

Market potential for high temperature process heat, 7:5667

(SERI/CP—633-1145)

Review of industrial energy use, 7:5451 (SERI/CP—633-1145)

Energy Demand

Energy end-use requirements in manufacturing, 7:5633

(SERI/TR—733-790R(Vol.1))

Energy end-use requirements in manufacturing, 7:5635

(SERI/TR—733-790R(Vol.3))

Energy end-use requirements in manufacturing, 7:5634

(SERI/TR—733-790R(Vol.2))

Energy Management

Electrical power management in industry, 7:5441

- Industrial energy management, 7:5440
- Process Heat**
 - Market potential for high temperature process heat, 7:5667 (SERI/CP—633-1145)
- Production**
 - Capacity strategies for the 1980s (Economic analysis essential), 7:5308
- Time-of-Use Pricing**
 - Customer response (At Pacific Gas and Electric Co.), 7:5590 (NP—22596)
- Waste Management**
 - Environmental quality and residuals management, 7:5323
- INPUT-OUTPUT ANALYSIS**
 - See *ENERGY ANALYSIS*
- INSULATION (THERMAL)**
 - See *THERMAL INSULATION*
- INTERCONNECTED POWER SYSTEMS**
 - Photovoltaic Power Plants
 - Photovoltaics: matching policy to technology, 7:5677
- INTEREST GROUPS**
 - Data Compilation
 - Investigation into environmental activism, 7:5325
- INTERMEDIATE TECHNOLOGY**
 - See *APPROPRIATE TECHNOLOGY*

J

- JAILS**
 - See *PUBLIC BUILDINGS*
- JAPAN**
 - Energy Policy
 - Japan (Book chapter), 7:5477
 - Japan's unique energy situation, 7:5489
 - Uranium
 - Present status and problems on extraction of uranium from seawater, 7:5405

K

- KUWAIT**
 - Government Policies
 - OPEC: present and future responsibility, 7:5552

L

- LABYRINTH**
 - See *AUDITORY ORGANS*
- LAND POLLUTION**
 - Deregulation
 - Reaganites, with OMB's list in hand, take dead aim at EPA's regulations, 7:5470
- LAND USE**
 - Regulations
 - Land use and energy, 7:5324 (ANL/AA—19)
- LANDFILLS**
 - See *SANITARY LANDFILLS*
- LASER WEAPONS**
 - Legal Aspects
 - Directed-energy weapons: a juridical analysis (Book), 7:5396
- LATIN AMERICA**
 - See also *MEXICO*
 - Economic Development
 - Issues in indigenous research and development in Third World countries, 7:5313
- LAWRENCE LIVERMORE LABORATORY**
 - Carpooling
 - Ridesharing and the database management system, 7:5281 (UCRL—86543)

- Vanpooling**
 - Ridesharing and the database management system, 7:5281 (UCRL—86543)

LEGISLATION

- Indexes**
 - State legislation: abstracts, 7:5468

LICENSING

- Nuclear energy: the way ahead, 7:5398

LINEAR PROGRAMMING

- Strategic offensive nuclear forces of the United States: a linear-programming model, 7:5406

LOAD ANALYSIS

- Electric-Utility Rate-Design Study: proceedings of the rate-design-study regional conferences, 7:5575 (NP—22596)
- Load research (Rationale and insights), 7:5580 (NP—22596)
- Load research (Programs at Los Angeles Dept. of Water and Power), 7:5581 (NP—22596)
- Load research (Program at Wisconsin Electric Power Co.), 7:5582 (NP—22596)
- Load research (Uses at Middle South Services, Inc.), 7:5583 (NP—22596)

LOAD MANAGEMENT

- Electric-Utility Rate-Design Study: proceedings of the rate-design-study regional conferences, 7:5575 (NP—22596)
- Load control at Detroit Edison, 7:5586 (NP—22596)
- Load management (Planning and programs at S. California Edison Co.), 7:5593 (NP—22596)
- Load management (As practiced at Dayton Power and Light Co.), 7:5594 (NP—22596)
- Load management (Review of Virginia Electric and Power Co. activities), 7:5595 (NP—22596)
- Load management (What to do/what not to do; Michigan PSC), 7:5597 (NP—22596)
- Load management (Approaches and regulatory goals; New York PSC), 7:5598 (NP—22596)
- Movement toward conservation (Survey of utility efforts), 7:5572

Attitudes

- Customer attitudes (Surveys by Elrick and Lavidge, Inc.), 7:5588 (NP—22596)

Control Systems

- Load management and controls (NIESPLAN at New England Power Service Co.), 7:5587 (NP—22596)

Equipment

- Equipment for load management, 7:5584 (NP—22596)
- Load control (Experiences at Arizona Public Service Co.), 7:5585 (NP—22596)

Evaluation

- Load-management evaluation (Use of integrative analysis), 7:5591 (NP—22596)
- Load-management application and evaluation (Decision making and cost-benefit analysis), 7:5592 (NP—22596)
- Load-management evaluation (From regulatory point of view; California PUC), 7:5596 (NP—22596)

Field Tests

- Program summary, 7:5430 (TVA/OP/ECR—81-19)

LOBBIES

- See *INTEREST GROUPS*

LOCAL GOVERNMENT

- Role of local government in energy policy (Book chapter), 7:5485

LOW-HEAD HYDROELECTRIC POWER PLANTS

Economic Analysis

- Modular hydro dam approach to the economic development of ultra low-head hydropower, 7:5566 (CONF-8106137—1)

Feasibility Studies

- Modular hydro dam approach to the economic development of ultra low-head hydropower, 7:5566 (CONF-8106137—1)

LUMBER INDUSTRY

- See *WOOD PRODUCTS INDUSTRY*

M

MAINE
Legislation
Case studies in state solar legislation, 7:546

MAIZE
Drying
Development of a biomass energy system for drying corn.
Final report, 1 July 1978 to June 1981, 7:5421
(DOE/CS-40054-11)

MANAGEMENT
See also ENERGY MANAGEMENT
LOAD MANAGEMENT
NUCLEAR MATERIAL MANAGEMENT
WASTE MANAGEMENT

Efficiency
Efficiency measurement in the regulated sector: an empirical study of the Massachusetts electric utility industry employing the Williamson expense preference theory in a pooled regression model, 7:5637

MANUFACTURING FACILITIES
See INDUSTRIAL FACILITIES

MARGINAL-COST PRICING
Cost and rates marginal cost, 7:5576 (NP-22596)

MARITIME TRANSPORT
Government Policies
Oil pollution by ocean vessels: an environmental tragedy: the legal regime of flag-of-convenience, multilateral conventions, and coastal state jurisdiction, 7:5635

Legal Aspects
Oil pollution by ocean vessels: an environmental tragedy: the legal regime of flag-of-convenience, multilateral conventions, and coastal state jurisdiction, 7:5635

MARKETING
Vertical Integration
Business performance and vertical integration, 7:5601 (CONF-800820-14)

MASS TRANSIT SYSTEMS
Planning
Balanced urban growth planning: transportation with respect to energy, demand, and environmental approach for bus transit supply system planning, 7:5443

MASSACHUSETTS
Electric Utilities
Efficiency measurement in the regulated sector: an empirical study of the Massachusetts electric utility industry employing the Williamson expense preference theory in a pooled regression model, 7:5637

MEDICAL CENTERS
See also HOSPITALS

Energy Conservation
Grants, cost-share, capital energy conservation efforts, 7:5433

Geothermal Heating Systems
Geothermal energy as a heat source for medical health facilities, 7:5678

METAL INDUSTRY
See also MINING

Energy Conservation
Status of the DOE activities and scientific and technological program II, 7:5577 (DOE/EI-12540-14)

Regulations
Metal coil surface coating industry: background information for proposed standards. Final report, 7:5295 (EPA-81/23572)

TAIS
See also METAL TAILINGS

Combustion Kinetics
Powdered metals as fuels, 7:5696

Fuel Substitution
Powdered metals as fuels, 7:5696

Recycling
Analysis of the recycling coefficients of non-ferrous metals in the US economy, 1959-1976, 7:5369

ETHANE
Recovery
Development of a case study for the Cinnaminson landfill methane recovery operation, 7:5637 (ANL/CONF-TM-73)

Long-range assessment of R & D policy for gas-related conversion technologies and unconventional natural gas resources, 7:5494 (BNL-51208)

Unconventional gas production and associated equipment markets, 7:5506

Research Programs
Long-range assessment of R & D policy for gas-related conversion technologies and unconventional natural gas resources, 7:5494 (BNL-51208)

MEXICO
Economic Policy
Mexico (Book chapter), 7:5480

Energy Policy
Mexico (Book chapter), 7:5480

Energy Source Development
Effective tax planning for Mexican operations, 7:5519

Political Aspects
Politics and administration in Mexico: recruitment and promotion of the politico-administrative class, 7:5458

MICHIGAN
Electric Utilities
Load management (What to do/what not to do; Michigan PSC), 7:5597 (NP-22596)

MIDDLE EAST
See also KUWAIT
TURKEY

Communities
Energy, environment, and new communities in hot-arid areas of the Middle East, 7:5321

Economic Development
Energy, environment, and new communities in hot-arid areas of the Middle East, 7:5321

Renewable Energy Sources
Energy, environment, and new communities in hot-arid areas of the Middle East, 7:5321

MILITARY EQUIPMENT
Energy Supplies
Army energy plan, 7:5446 (AD-A-091569)

MILITARY FACILITIES
Energy Supplies
Army energy plan, 7:5446 (AD-A-091569)

MINE-MOUTH GENERATING PLANTS
See TONNIE FUEL POWER PLANTS

MINERAL INDUSTRY
See also COAL INDUSTRY
METAL INDUSTRY
OIL SHALE INDUSTRY
PETROLEUM INDUSTRY

Offshore Operations
Interim deep-seabed mining legislation: an international environmental perspective, 7:5368

MINERAL RESOURCES
Ownership
Surface owner's estate becomes dominant: Wyoming's surface owner consent statute, 7:5539

MINERAL RIGHTS
Mining Laws
Coping with the General Mining Law of 1872 in the 1980's, 7:5372

MINING LAWS
See also SURFACE MINING ACTS

Legal Aspects
Coal leases held real property, 7:5530

MINING RIGHTS
See MINERAL RIGHTS

MOBILE HOMES
Fuel Consumption
National Interim Energy-Consumption Survey. Part IV. Transportation panel. Including Appendices A through C, 7:5627 (DOE/EIA/10085-TI(Pt.4))

National Interim Energy-Consumption Survey. Part V. Transportation panel. Appendices D through H, 7:5628 (DOE/EIA/10085-TI(Pt.5))

Shading
Passive cooling and heating program at Oak Ridge National Laboratory for FY-1981, 7:5640 (CONF-810832-5)

MONOPOLIES

Resource Development

Resource extraction by a monopolist with influence over the rate of return on non-resource assets, 7:5304

MONTANA

Gas Utilities

Trends and issues in retail rate design: the Montana experience or the Montana Power Company experience, 7:5547

MOTORCYCLES

Deregulation

Reaganites, with OMB's list in hand, take dead aim at EPA's regulations, 7:5470

MULTINATIONAL ENTERPRISES

Taxes

Taxation of United States investment in oil and gas exploration, development, and production in selected countries, 7:5302

MUNICIPAL BUILDINGS

See PUBLIC BUILDINGS

N

NATIONAL ENERGY PLAN

Environmental trends to the year 2000, 7:5326 (DOE/EP-0021)

Reviews

Congress and national energy policy: assessing the policymaking process (Book chapter), 7:5484

NATIONAL ENVIRONMENTAL POLICY ACT

Lawsuits

NEPA litigation in the 1970s: a deluge or a dribble, 7:5337

NATIONAL SECURITY

Energy Supplies

US energy self-reliance will ensure national security, 7:5464

NATURAL DEPLETION

See PRIMARY RECOVERY

NATURAL GAS

Deregulation

Burning questions about natural gas, 7:5513

Exploration

European natural gas: exploration urged as alternative to Siberian pipeline, 7:5517

Intergovernmental restraints on oil and gas developments, 7:5538

Prices

Incremental pricing, 7:5545

Natural gas rate design in Wisconsin, 7:5546

Natural gas pricing: policy and impact on the local community, 7:5542

Standby or supplemental rates, 7:5548

Trends and issues in retail rate design: the Montana experience or the Montana Power Company experience, 7:5547

Recovery

Long-range assessment of R & D policy for gas-related conversion technologies and unconventional natural gas resources, 7:5494 (BNL-51208)

Unconventional gas production and associated equipment markets, 7:5506

Research Programs

Long-range assessment of R & D policy for gas-related conversion technologies and unconventional natural gas resources, 7:5494 (BNL-51208)

Resource Potential

Burning questions about natural gas, 7:5513

Retail Prices

Natural gas-retail, 7:5544

Supply and Demand

Gas demand in severe weather: aspects of forecasting and planning, 7:5532

Systems Analysis

Systems analysis of hydrogen/natural gas supplementation and separation, 7:5559 (BNL-29520)

Underground Storage

Underground natural gas storage in the United States, 1980 to 1981 heating year (April 1980-March 1981), 7:5498 (DOE/EIA-0239-80)

NATURAL GAS DEPOSITS

Resource Assessment

Unconventional gas production and associated equipment markets, 7:5506

NATURAL GAS FIELDS

Equipment

Costs and indexes for domestic oil and gas field equipment and production operations, 1980, 7:5496 (DOE/EIA-0185-80)

Exploration

Costs and indexes for domestic oil and gas field equipment and production operations, 1980, 7:5496 (DOE/EIA-0185-80)

NATURAL GAS INDUSTRY

Accounting

Financial disclosures for oil and gas producers, 7:5522

Deregulation

Energy forecast: partial clearing, 7:5471

Financial Data

Performance profiles of major energy producers 1979, 7:5497 (DOE/EIA-0206-79)

NATURAL GAS WELLS

Taxes

Recapture of intangible drilling and development costs: a discussion of the proposed regulations, 7:5291

NEPA

See NATIONAL ENVIRONMENTAL POLICY ACT

NEW MEXICO

Mining Laws

Coal leases held real property, 7:5530

Water Resources

United States v. New Mexico: purposes that hold no water, 7:5375

NEW YORK

See also NEW YORK CITY

Power and the environment: a case study of the siting of 765-kilovolt transmission line (Book chapter), 7:5614

Electric Power

New York Power Pool, 7:5563

Electric Utilities

Load management (Approaches and regulatory goals; New York PSC), 7:5598 (NY 22596)

Energy Policy

New York State energy master plan and long-range electric and gas report. Volume 1. Executive summary. Final report, 7:5460 (PB-81-118028)

New York State energy master plan and long-range electric and gas report. Volume 2. Appendices. Final report, 7:5461 (PB-81-118036)

New York State energy master plan and long-range electric and gas report. Volume 3. Final report, 7:5462 (PB-81-118044)

NEW YORK CITY

Fuel Supplies

New oil contract escalator seen cutting NYC fuel bills, 7:5515

NIGERIA

Economic Development

Nigeria (Book chapter), 7:5481

Energy Policy

Nigeria (Book chapter), 7:5481

NITROGEN DIOXIDE

Deregulation

Reaganites, with OMB's list in hand, take dead aim at EPA's regulations, 7:5470

NITROGEN OXIDES

See also NITROGEN DIOXIDE

Ecological Concentration

Acid rain fallout threatens subsidies for utilities that convert to coal, 7:5490

NOISE POLLUTION

Biological Effects

Noise pollution in urban ghettos: assessment, issues and challenges, 7:5351

Deregulation

Reaganites, with OMB's list in hand, take dead aim at EPA's regulations, 7:5470

NON-PROLIFERATION POLICY

Decision Making

International nuclear proliferation: multilateral diplomacy and regional aspects (Book), 7:5408

NON-PROLIFERATION TREATY

Evaluation

International nuclear proliferation: multilateral diplomacy and regional aspects (Book), 7:5408

NORTHERN IRELAND

See UNITED KINGDOM

NUCLEAR ENERGY

Energy Policy

Activities of the inquiry commission on the future nuclear policy. Findings and discussion, 7:5404

Energy inquiry of the West German Parliament. 4 ways into the future, 7:5394

Energy Source Development

Expected future development of nuclear energy until the year 2000, 7:5401

Forecasting

Energy inquiry of the West German Parliament. 4 ways into the future, 7:5394

Public Opinion

Documents on the problems connected with the peaceful use of nuclear power. Facts, problems, interrelationships, basic concepts and principles underlying the opinions stated, comments by the church, literature references, 7:5395

Public Relations

Documents on the problems connected with the peaceful use of nuclear power. Facts, problems, interrelationships, basic concepts and principles underlying the opinions stated, comments by the church, literature references, 7:5395

NUCLEAR FACILITIES

Safety

General safety assessment document for PNI-managed nonreactor nuclear facilities, 7:5392 (PNI. -3280)

NUCLEAR INDUSTRY

Deregulation

Reaganites, with OMB's list in hand, take dead aim at EPA's regulations, 7:5470

Financial Data

Performance profiles of major energy producers 1979, 7:5497 (DOE/EIA 0206-79)

Statistics

Statistical data of the uranium industry, 7:5388 (CIC)-01664

NUCLEAR MATERIALS MANAGEMENT

Accounting

International safeguards for spent fuel storage, 7:5390 (ORNL/SUB 7605/12-2)

NUCLEAR POWER

Coal and nuclear energy. A basis for a secure energy supply, 7:5380

Radioactive waste management, 7:5400

Case Law

High technology and the courts: nuclear power and the need for institutional reform, 7:5387

Education

Nuclear energy: the way ahead, 7:5398

Energy Policy

Nuclear energy: the way ahead, 7:5398

What if we reversed the What If syndrome, 7:5402

Health Hazards

Nuclear power risks: challenge to the credibility of science, 7:5355

Legal Aspects

High technology and the courts: nuclear power and the need for institutional reform, 7:5387

Public Opinion

Nuclear genie: beyond Faust, fate, and incantations, 7:5403

What if we reversed the What If syndrome, 7:5402

Risk Assessment

Nuclear power risks: challenge to the credibility of science, 7:5355

NUCLEAR POWER PLANTS

Economic Analysis

An economic analysis of the effects of regulatory delay on nuclear power plant construction. Technical report, 7:5391 (PB-81-124422)

Environmental Impacts

Energy-environmental trade-offs in the courts: nuclear and fossil fuels (Book chapter), 7:5348

Lawsuits

Energy-environmental trade-offs in the courts: nuclear and fossil fuels (Book chapter), 7:5348

NUCLEAR TRADE

Bilateral Agreements

Supply-side non-proliferation, 7:5382

NUCLEAR WEAPONS

Civil Defense

US civil-defense decision-making: the Ford and Carter administrations, 7:5407

International Agreements

Nuclear threat: can Europe build a common defense, 7:5399

Military Equipment

Strategic offensive nuclear forces of the United States: a linear-programming model, 7:5406

Military Personnel

Strategic offensive nuclear forces of the United States: a linear-programming model, 7:5406

Non-Proliferation Policy

Politics, plutonium, and energy interdependence, 7:5389

Supply-side non-proliferation, 7:5382

Public Opinion

Prevention of nuclear war, 7:5384

Radiation Hazards

Prevention of nuclear war, 7:5384

O

OCCUPATIONS

Regional Analysis

Meeting the solar energy industry's labor needs, 7:5685

OCEAN THERMAL ENERGY CONVERSION

Reviews

Solar Technology Assessment Project. Volume VII. A review of OTEC, 7:5642 (DOE/CS/30278-T6)

Technology Assessment

Solar Technology Assessment Project. Volume VII. A review of OTEC, 7:5642 (DOE/CS/30278-T6)

OCEANS

See SEAS

OFFICE BUILDINGS

Passive Solar Cooling Systems

Passive cooling and heating program at Oak Ridge National Laboratory for FY-1981, 7:5640 (CONF-810832-5)

Passive Solar Heating Systems

Passive cooling and heating program at Oak Ridge National Laboratory for FY-1981, 7:5640 (CONF-810832-5)

OHIO

Pollution Laws

Environmental compliance program handbook, 7:5511 (ORNL/EIS-171)

Pollution Regulations

Environmental compliance program handbook, 7:5511 (ORNL/EIS-171)

OIL BURNERS

Fuel Substitution

Coal-oil mixtures: an alternative fuel for the commercial markets and large residential markets, 7:5493 (BNL-29773)

OIL FIELDS

Equipment

Costs and indexes for domestic oil and gas field equipment and production operations, 1980, 7:5496 (DOE/EIA-0185-80)

Exploitation

Costs and indexes for domestic oil and gas field equipment and production operations, 1980, 7:5496 (DOE/EIA-0185-80)

OIL SANDS

Bibliographies

Bibliography of publications dealing with (DOE/ETC/RI-81-2)

Resource Development

Tar sand: a petroleum resource of the future, 7:5508 (LA—8936)

OIL SHALE INDUSTRY

See also MINERAL INDUSTRY

Energy Source Development

Exxon gets serious about shale, 7:5525

Occupational Safety

Viewpoint on occupational health in the oil-shale industry, 7:5509 (LA-UR—81-2309)

OIL SHALE MINING

Legal Aspects

Oil shale and water quality: the Colorado prospectus under federal, state, and international law, 7:5534

Water Pollution

Oil shale and water quality: the Colorado prospectus under federal, state, and international law, 7:5534

Water Requirements

Effect of water law on the development of oil shale, 7:5535
Water for oil shale: framework for the legal issues, 7:5533

OIL SPILL FINGERPRINTING

See OIL SPILLS

OIL SPILLS

Environmental Impacts

Oil pollution by ocean vessels - an environmental tragedy: the legal regime of flags of convenience, multilateral conventions, and coastal states, 7:5350

Taxes

Oil pollution by ocean vessels - an environmental tragedy: the legal regime of flags of convenience, multilateral conventions, and coastal states, 7:5350

OIL WELLS

See also PETROLEUM

Taxes

Recapture of intangible drilling and development costs: a discussion of the proposed regulations, 7:5291

OIL-EXPORTING COUNTRIES

See also OPEC

Data Compilation

Situation report for petroleum exporting countries, 7:5495 (BNL—51314)

OIL-IMPORTING COUNTRIES

Data Compilation

Situation report for petroleum exporting countries, 7:5495 (BNL—51314)

Economics

Simple macroeconomics of an oil-dependent economy, 7:5524

Energy Supplies

World oil and cold reality (Supply conforms to producer logic), 7:5540

International Cooperation

Oil diplomacy: the Atlantic nations in the oil crisis of 1978-79 (Book), 7:5550

ON-SITE POWER GENERATION

Economic Impact

Integration of decentralized generators with the electric power grid, 7:5574 (MIT-EL—81-011)

OPEC

(Organization of Petroleum Exporting Countries.)

Will oil imports be available: and at what price (Book chapter), 7:5536

Cartels

Bushel of wheat for a barrel of oil: can we offset OPEC's gains with a grain cartel, 7:5507

Economic Impact

Oil diplomacy: the Atlantic nations in the oil crisis of 1978-79 (Book), 7:5550

Simple macroeconomics of an oil-dependent economy, 7:5524

Economic Policy

World oil and cold reality (Supply conforms to producer logic), 7:5540

Supply Disruption

Oil diplomacy: the Atlantic nations in the oil crisis of 1978-79 (Book), 7:5550

OREGON

Solar Industry

Oregon Solar Business Directory, 7:5674 (WSUN—75)

ORGANIC CHLORINE COMPOUNDS

Deregulation

Reagents, with OMB's list in hand, take dead aim at EPA's regulations, * 5470

ORGANIC COMPOUNDS

Deregulation

Reagents, with OMB's list in hand, take dead aim at EPA's regulations, * 5470

ORGANIC FLUORINE COMPOUNDS

Deregulation

Reagents, with OMB's list in hand, take dead aim at EPA's regulations, * 5470

OTEC

See OCEAN THERMAL ENERGY CONVERSION

OZONE

Deregulation

Reagents, with OMB's list in hand, take dead aim at EPA's regulations, * 5470

P

PARKS (ENERGY)

See ENERGY

PARKS (INDUSTRIAL)

See INDUSTRIAL PARKS

PARTICULATES

Deregulation

Reagents, with OMB's list in hand, take dead aim at EPA's regulations, * 5470

PASSIVE SOLAR COOLING SYSTEMS

Technology Assessment

Solar Technology Assessment Project, Volume IV: Solar air conditioning systems: hot and passive, * 5641 (DOE-OS-SOLAR-116)

Solar Technology Assessment Project, Volume II: Passive solar technology, * 5640 (DOE-OS-SOLAR-116)

PASSIVE SOLAR HEATING SYSTEMS

See SOLAR HEATING SYSTEMS

Comparative Evaluations

Comparative analysis of solar technologies and effects of market penetration on hot and passive, * 5641 (DOE-OS-SOLAR-116)

Computerized Simulation

Performance analysis of hot and passive solar heating systems, * 5641 (DOE-OS-SOLAR-116)

Performance

Performance analysis of hot and passive solar heating systems, * 5641 (DOE-OS-SOLAR-116)

Performance Testing

Performance analysis of hot and passive solar heating systems, * 5641 (DOE-OS-SOLAR-116)

Technology Assessment

Solar Technology Assessment Project, Volume II: Passive solar technology, * 5640 (DOE-OS-SOLAR-116)

PEAK-LOAD PRICING

Cost Benefit Analysis

Peak-load pricing: an economic analysis, * 5647

PENNSYLVANIA

Energy Policy

Coal: the state's energy policy, * 5648

Pollution Regulations

Pennsylvania's air quality: impasse air pollution standards upheld, * 5649

PEOPLES REPUBLIC OF CHINA

See CHINA

PERSIAN GULF

Industry

Comparative economic and basic industries in the Arabian Gulf region, * 5649

PESTICIDES

Deregulation

Reagents, with OMB's list in hand, take dead aim at EPA's regulations, * 5470

PETROCHEMICAL FEEDSTOCKSSee **PETROCHEMICALS****PETROCHEMICAL PLANTS****Site Selection**

People and petrochemicals: siting controversies on the urban waterfront, 7:5316

Urban waterfront: planning perspectives and energy facility siting, 7:5317

PETROCHEMICALS**Energy Policy**

Petroleum: too valuable to burn, 7:5541

PETROLEUMSee also **OIL WELLS****Energy Shortages**Macroeconomics and oil-supply disruptions, 7:5502
(DOE/PE/70278-117)**Energy Supplies**

Energy: elusive solutions, 7:5284

Exploration

Intergovernmental restraints on oil and gas developments, 7:5538

Exports

Venezuela, Trinidad and Tobago: crude oil potential from known deposits, 7:5499 (DOE/EIA-0297)

Forecasting

World oil and cold reality (Supply conforms to producer logic), 7:5540

Imports

Will oil imports be available: and at what price (Book chapter), 7:5536

Inventories

Figuring on energy: politics of drawdown, 7:5516

Prices

OPEC: present and future responsibility, 7:5552

Optimal oil-pricing policy for Saudi Arabia, 7:5549

Pricing Regulations

Department of Energy needs to resolve billions in alleged oil-pricing violations, 7:5504 (EIMD-8145)

Production

Situation report for petroleum-exporting countries, 7:5495 (BNI-51314)

Regulations

Public choice of price control and rationing of oil, 7:5518

Reserves

Venezuela, Trinidad and Tobago: crude oil potential from known deposits, 7:5499 (DOE/EIA-0297)

Supply and Demand

MIT world oil project outlook, 7:5556

Supply Disruption

Energy crises in historical perspective, 7:5529

PETROLEUM COKESee **PETROLEUM PRODUCTION****PETROLEUM INDUSTRY**See also **MINERAL INDUSTRY****Accounting**

Financial disclosures for oil and gas producers, 7:5522

Contracts

Nonperformance in oil contracts, 7:5521

Data Compilation

Situation report for petroleum-exporting countries, 7:5495 (BNI-51314)

Deregulation

Energy forecast: partial clearing, 7:5471

Economic Analysis

Costs and indexes for domestic oil and gas field equipment and production operations, 1980, 7:5496 (DOE/EIA-0185-80)

Economic Impact

Washington legislative outlook on energy, 7:5553

Financial Data

Performance profiles of major energy producers 1979, 7:5497 (DOE/EIA-0206-79)

Forecasting

American petroleum problems and the future outlook, 7:5557

Government Policies

Mexico (Book chapter), 7:5480

International Cooperation

Energy and the future: a crossroads for the world, 7:5555

Legal Aspects

Nonperformance in oil contracts, 7:5521

Site Selection

Air quality and urban waterfront development: a review of government regulations and attitudes, 7:5353

Statistical Models

MIT world oil project outlook, 7:5556

PETROLEUM PRODUCTSSee also **GASOLINE****Economic Elasticity**

Refinery mix in the US, Canada, and the EEC, 7:5523

Petrochemicals

Petroleum: too valuable to burn, 7:5541

PETROLEUM REFINERIES**Government Policies**

Forecast for the refining industry: a 100% chance of political chaos, 7:5491

Petroleum Products

Refinery mix in the US, Canada, and the EEC, 7:5523

Regulations

Forecast for the refining industry: a 100% chance of political chaos, 7:5491

Site Selection

Impacts of permitting delays on investment desirability, 7:5319

Systems Analysis

Simultaneous-equation analysis of the structure and performance of the United States petroleum-refining industry, 7:5287

PHILIPPINES**Population Dynamics**

Rural electrification and fertility change in the southern Philippines, 7:5623

PHOTOCHEMICAL OXIDANTS**Air Pollution Abatement**

EPA's emission offset policy and energy facility siting, 7:5354

PHOTOVOLTAIC POWER PLANTS**Economics**

Photovoltaics: matching policy to technology, 7:5677

PHOTOVOLTAIC POWER SUPPLIES**Economics**

Photovoltaics: matching policy to technology, 7:5677

Technology Assessment

Solar Technology Assessment Project. Volume VI.

Photovoltaic technology assessment, 7:5645
(DOE/CS/30278-T9)**PICEANCE CREEK BASIN****Oil Shale Industry**

Exxon gets serious about shale, 7:5525

PLANTS (INDUSTRIAL)See **INDUSTRIAL PLANTS****PLANTS (POWER)**See **POWER PLANTS****PLUTONIUM****Safeguards**

Politics, plutonium, and energy interdependence, 7:5389

POLLUTANTS**Economic Analysis**

Separability, functional structure, and aggregation for a class of models in environmental economics, 7:5336

POLLUTION ABATEMENTSee also **AIR POLLUTION ABATEMENT****Bibliographies**

Making pollution prevention pay (Includes Bibliography of No-Waste Technology), 7:5328

Financial Incentives

Making pollution prevention pay (Includes Bibliography of No-Waste Technology), 7:5328

POLLUTION CONTROLSee also **AIR POLLUTION CONTROL**
WATER POLLUTION CONTROL**Cost**

Impact of environmental control costs on an indirect coal liquefaction process, 7:5510 (ORNL-5722)

Economic Impact

Impact of environmental control costs on an indirect coal liquefaction process, 7:5510 (ORNL-5722)

Marketing

Environmental quality and residuals management, 7:5323

Political Aspects

Environmental quality and residuals management, 7:5323

POLLUTION REGULATIONS**Economic Impact**

Impact of environmental control costs on an indirect coal liquefaction process, 7:5510 (ORNL—5722)

Lawsuits

Pennsylvania's technologically impossible air-pollution standards upheld, 7:5339

POLLUTION SOURCES**Research Programs**

What we know about acid rain, 7:5352

POWER DEMAND**Control**

Demand control: a cost-effective approach, 7:5612

Forecasting

Capability of US to meet demand causes concern, 7:5616
Electricity demand forecasting: realism at last, 7:5618
Integration of decentralized generators with the electric power grid, 7:5574 (MIT-EL—81-011)

POWER GENERATION

See also *COGENERATION*

Environmental Impacts

More power, less pollution, 7:5610

Expansion

Electric generation expansion analysis system. A progress report on Pri 1529, 7:5604 (PB—81-119778)

Institutional Factors

Public-utility participation in decentralized power production, 7:5613

Pollution Abatement

More power, less pollution, 7:5610

POWER PLANTS

See also *DUAL-PURPOSE POWER PLANTS*
HYDROELECTRIC POWER PLANTS

Availability

Future powerplant availability: improvement study. Final report, 7:5570 (DOE/RG/06666—T1)

Licensing

Need for power and the choice of technologies: state decisions on electric power facilities, 7:5568 (DOE/EP/10004—1)

Regulations

Future powerplant availability: improvement study. Final report, 7:5570 (DOE/RG/06666—T1)
Need for power and the choice of technologies: state decisions on electric power facilities, 7:5568 (DOE/EP/10004—1)

Reliability

Future powerplant availability: improvement study. Final report, 7:5570 (DOE/RG/06666—T1)

Site Selection

Coastal zone conflicts and urban opportunities, 7:5315

POWER POOLS

See *INTERCONNECTED POWER SYSTEMS*

POWER SYSTEMS

See also *INTERCONNECTED POWER SYSTEMS*

Dispersed Storage and Generation

Concepts for design of an energy-management system incorporating dispersed storage and generation, 7:5655 (DOE/ET/29372—1)

Interfaces

Analysis barriers to improving the hydroelectric power interface with electric power systems. Final report, 7:5603 (PB—81-117244)

Load Management

Concepts for design of an energy-management system incorporating dispersed storage and generation, 7:5655 (DOE/ET/29372—1)

Operation

Concepts for design of an energy-management system incorporating dispersed storage and generation, 7:5655 (DOE/ET/29372—1)
Integration of decentralized generators with the electric power grid, 7:5574 (MIT-EL—81-011)

Optimization

Analysis barriers to improving the hydroelectric power interface with electric power systems. Final report, 7:5603 (PB—81-117244)

Planning

Electric generation expansion analysis system. A progress report on Pri 1529, 7:5604 (PB—81-119778)

POWER TRANSMISSION LINES**Health Hazards**

Power and the environment: a case study of the siting of 765-kilovolt transmission line (Book chapter), 7:5614

PRESSURE GROUPS

See *INTEREST GROUPS*

PRICES

See also *INCREMENTAL-COST PRICING*
MARGINAL-COST PRICING
PEAK-LOAD PRICING

Correlations

Analysis of the recycling coefficients of non-ferrous metals in the US economy, 1959-1976, 7:5369

PRICING REGULATIONS**Enforcement**

Department of Energy needs to resolve billions in alleged oil-pricing violations, 7:5504 (EMD—81-45)

Violations

Department of Energy needs to resolve billions in alleged oil-pricing violations, 7:5504 (EMD—81-45)

PRIMARY RECOVERY**Operating Cost**

Costs and indexes for domestic oil and gas field equipment and production operations, 1980, 7:5496 (DOE/EIA—0185-80)

PROCESS HEAT

See also *SOLAR PROCESS HEAT*

Energy Demand

Energy end-use requirements in manufacturing, 7:5635 (SERI/TR—733-79OR(Vol.3))

Energy end-use requirements in manufacturing, 7:5634 (SERI/TR—733-79OR(Vol.2))

Marketing Research

Energy end-use requirements in manufacturing, 7:5633 (SERI/TR—733-79OR(Vol.1))
Market potential for high temperature process heat, 7:5667 (SERI/CP—633-1145)

PRODUCTION

(Limited to industrial production; see also *PARTICLE PRODUCTION*)

Economic Analysis

Capacity strategies for the 1980s (Economic analysis essential), 7:5308

PRODUCTION (HYDROGEN)

See *HYDROGEN PRODUCTION*

PROFESSIONS

See *OCCUPATIONS*

PROLIFERATION**International Cooperation**

Supply-side non-proliferation, 7:5382

International Relations

International nuclear proliferation: multilateral diplomacy and regional aspects (Book), 7:5408

Political Aspects

Politics, plutonium, and energy interdependence, 7:5389

PROSPECTING**Mining Laws**

Coping with the General Mining Law of 1872 in the 1980's, 7:5372

PROTECTION

See *SAFETY*

PUBLIC BUILDINGS**Energy Conservation**

Energy conservation in museums, 7:5425 (NYSERDA—80-27)
Role of local government in energy policy (Book chapter), 7:5485

Energy Consumption

Energy conservation in museums, 7:5425 (NYSERDA—80-27)

PUBLIC HEALTH**Cost Benefit Analysis**

Three challenges of risk-benefit assessment, 7:5340

PUBLIC LANDS**Mineral Rights**

Coping with the General Mining Law of 1872 in the 1980's, 7:5372

Water Rights

Non-Indian federal-reserved water rights, 7:5370

PUBLIC POLICY**Institutional Factors**

Institutional limits to national public planning for forest resources: the Resources Planning Act, 7:5365

PUBLIC UTILITIES

See also *ELECTRIC UTILITIES*
GAS UTILITIES

Energy Efficiency

Energy efficiency and the utilities: new directions (Symposium proceedings), 7:5605

Regulations

Public utility regulation and the decade ahead, 7:5620

PUBLIC UTILITY REGULATORY POLICIES ACT**Compliance**

Progress with PURPA: the activities of Pacific Gas and Electric Company in meeting the requirements of Section 133 of the Public Utility Regulatory Policies Act of 1978, 7:5622

Reviews

Purpa primer, 7:5466

PUMPED STORAGE POWER PLANTS**Site Selection**

Hydropower sites of the United States developed and undeveloped: river basin maps showing site locations (conventional, pumped storage, retired), 7:5571 (DOE/TIC—1029964)

Water Resources

Hydropower sites of the United States developed and undeveloped: river basin maps showing site locations (conventional, pumped storage, retired), 7:5571 (DOE/TIC—1029964)

R**RADIATION HAZARDS****Attitudes**

Prevention of nuclear war, 7:5384

RADIOACTIVE WASTE DISPOSAL**Decision Making**

High-level nuclear-waste disposal: information exchange and conflict resolution, 7:5383 (DOE/ET/46608—1)

Deregulation

Reaganites, with OMB's list in hand, take dead aim at EPA's regulations, 7:5470

High-Level Radioactive Wastes

High-level nuclear-waste disposal: information exchange and conflict resolution, 7:5383 (DOE/ET/46608—1)

RADIOACTIVE WASTE MANAGEMENT**Alpha-Bearing Wastes**

INFX guide: summary of US DOE plans and policies for international cooperation in the field of radioactive waste management, 7:5393 (PNL—3774)

High-Level Radioactive Wastes

INFX guide: summary of US DOE plans and policies for international cooperation in the field of radioactive waste management, 7:5393 (PNL—3774)

International Cooperation

INFX guide: summary of US DOE plans and policies for international cooperation in the field of radioactive waste management, 7:5393 (PNL—3774)

Managing nuclear wastes: the international connection, 7:5397

Legal Aspects

Radioactive waste management, 7:5400

Low-Level Radioactive Wastes

INFX guide: summary of US DOE plans and policies for international cooperation in the field of radioactive waste management, 7:5393 (PNL—3774)

Technology Assessment

Radioactive waste management, 7:5400

RAIL TRANSPORT**Government Policies**

National Transportation Policy Study Commission and its final report: a review, 7:5312

RAILWAYS**Energy Demand**

Energy-economy study methods and transit cases. Final report, 7:5448 (DOE/CS/50189—T1)

RANKINE CYCLE POWER SYSTEMS**Specifications**

Residual-energy-applications program: EAST-facility requirements document, 7:5414 (DOE/ET/12866—8-Vol.2)

RATE STRUCTURE

Cost and rates, 7:5576 (NP—22596)

Cost and rates: marginal cost, 7:5578 (NP—22596)

Cost and rates (Recommendations for cost-based rates), 7:5579 (NP—22596)

Cost-based rates (Four methods of time-differentiated accounting costs), 7:5577 (NP—22596)

Customer attitudes (Surveys by Elrick and Lavidge, Inc.), 7:5588 (NP—22596)

Equipment for load management, 7:5584 (NP—22596)

Load control (Experiences at Arizona Public Service Co.), 7:5585 (NP—22596)

Load control at Detroit Edison, 7:5586 (NP—22596)

Load management and controls, 7:5587 (NP—22596)

Load-management evaluation (Use of integrative analysis), 7:5591 (NP—22596)

Load-management application and evaluation (Decision making and cost-benefit analysis), 7:5592 (NP—22596)

Load management (Planning and programs at S. California Edison Co.), 7:5593 (NP—22596)

Load management (As practiced at Dayton Power and Light Co.), 7:5594 (NP—22596)

Load management (Review of Virginia Electric and Power Co. activities), 7:5595 (NP—22596)

Load-management evaluation (From regulatory point of view; California PUC), 7:5596 (NP—22596)

Load management (What to do/what not to do; Michigan PSC), 7:5597 (NP—22596)

Load management (Approaches and regulatory goals; New York PSC), 7:5598 (NP—22596)

Load research (Rationale and insights), 7:5580 (NP—22596)

Load research (Programs at Los Angeles Dept. of Water and Power), 7:5581 (NP—22596)

Load research (Program at Wisconsin Electric Power Co.), 7:5582 (NP—22596)

Load research (Uses at Middle South Services, Inc.), 7:5583 (NP—22596)

Long-term outlook for the electric-power business, 7:5599 (NP—22596)

Time-of-use rate studies with residential customers (By Research Triangle Inst.), 7:5589 (NP—22596)

Attitudes

Customer response (At Pacific Gas and Electric Co.), 7:5590 (NP—22596)

Economic Elasticity

Customer response (At Pacific Gas and Electric Co.), 7:5590 (NP—22596)

Meetings

Electric-Utility Rate-Design Study: proceedings of the rate-design-study regional conferences, 7:5575 (NP—22596)

Regulations

Regulation and the electric-utility industry, 7:5600 (NP—22596)

RDF

See *REFUSE DERIVED FUELS*

REACTOR SAFETY

(Theoretical and experimental investigations of the behavior of reactor types and designs under various real or hypothetical accidents.)

Nuclear energy: the way ahead, 7:5398

REACTOR SITING

See *SITE SELECTION*

RECYCLING

Correlations

Analysis of the recycling coefficients of non-ferrous metals in the US economy, 1959-1976, 7:5369

REFUSE DERIVED FUELS

See also *INDUSTRIAL WASTES*
SYNTHETIC FUELS

Municipal Wastes

Garbage-to-electricity. Part I. Success elusive in garbage power, 7:5608

REFUSE-FUELED POWER PLANTS

Performance

Garbage-to-electricity. Part I. Success elusive in garbage power, 7:5608

REGULATIONS

See also *POLLUTION REGULATIONS*
PRICING REGULATIONS

Cost Benefit Analysis

Economics of permitting: an approach, 7:5318

Economic Impact

Analytical studies for the U.S. Environmental Protection Agency. Volume VI. Implications of environmental regulations for energy production and consumption, 7:5459 (PB—81-116501)

Metal coil surface coating industry - background information for proposed standards. Final report, 7:5298 (PB—81-123572)

Environmental Impacts

Analytical studies for the U.S. Environmental Protection Agency. Volume VI. Implications of environmental regulations for energy production and consumption, 7:5459 (PB—81-116501)

Metal coil surface coating industry - background information for proposed standards. Final report, 7:5298 (PB—81-123572)

Government Policies

Who will set the standards for groups that set industry product standards, 7:5438

Public Policy

Public choice of price control and rationing of oil, 7:5518

RENEWABLE ENERGY SOURCES

See also *BIOMASS*

GEOTHERMAL ENERGY
HYDROELECTRIC POWER
SOLAR ENERGY
WIND POWER

Energy, environment, and new communities in hot-arid areas of the Middle East, 7:5321

Directories

Information resources in the USA on new and renewable energy: a description and directory, 7:5639 (CONF-810802—2)

Energy Source Development

Energy for America (Book), 7:5687

RENEWABLE RESOURCES

Optimization

Optimal management of renewable resources with growing demand and stock externalities, 7:5364

REPUBLIC OF CHINA

See *TAIWAN*

RESEARCH PROGRAMS

Management

Chemical Testing and Assessment Research Committee - research strategy 1979-1985, 7:5333 (PB—81-121105)

RESIDENTIAL BUILDINGS

See also *HOUSES*

Energy Conservation

Residential site design and energy conservation. Part I: general report, 7:5424 (NP—1904010)

Site Selection

Residential site design and energy conservation. Part I: general report, 7:5424 (NP—1904010)

Solar Space Heating

Comparison of residential window distributions and effects of mass and insulation, 7:5669 (SERI/TP—721-1300)

Thermal Insulation

Court overrules insulation standard set by Pennsylvania utility, 7:5435

RESIDENTIAL SECTOR

Energy Conservation

Role of local government in energy policy (Book chapter), 7:5485

Energy Demand

Fuel choice and aggregate energy demand in the residential and commercial sectors, 7:5456

Fuel Substitution

Coal-oil mixtures: an alternative fuel for the commercial markets and large residential markets, 7:5493 (BNL—29773)

Time-of-Use Pricing

Time-of-use rate studies with residential customers (By Research Triangle Inst.), 7:5589 (NP—22596)

RESOURCE CONSERVATION

Economics

Costly innovation and natural resources, 7:5373

Legal Aspects

Shifting sands of Federal barrier-islands policy, 7:5341

RESOURCE DEVELOPMENT

Decision Making

Public involvement manual: involving the public in water and power resources decisions, 7:5299 (PB—81-124810)

Economics

Resource extraction by a monopolist with influence over the rate of return on non-resource assets, 7:5304

Legal Aspects

Coal burning issues (Book - monograph), 7:5505

Management

Optimal management of renewable resources with growing demand and stock externalities, 7:5364

Public Opinion

Public involvement manual: involving the public in water and power resources decisions, 7:5299 (PB 81-124810)

Socio-Economic Factors

Analysis of socioeconomic issues and impact of development of the Bravo Dome carbon dioxide field. Final report, February 1, 1980-January 31, 1981, 7:5359 (NP 1903562)

Water Rights

Non-Indian federal-reserved water rights, 7:5370

RESOURCE RECOVERY FACILITIES

Construction

Development of a case study for the Cinnaminson landfill methane recovery operation, 7:5637 (ANI/CNSV-TM—73)

Economic Impact

Individual biomass facility reports supplement to some employment and earnings implications of regional biomass energy utilization: New England and the cornbelt states, 7:5664 (ORAU 181B)

Operation

Development of a case study for the Cinnaminson landfill methane recovery operation, 7:5637 (ANI/CNSV-TM—73)

RIDESHARING

See *CARPPOOLING*
CARPPOOLING

RISER CRACKING

See *COAL LIQUEFACTION*

RISK ASSESSMENT

Nuclear energy: the way ahead, 7:5398

Comparative Evaluations

Nuclear genie: beyond Faust, fate, and incantations, 7:5403

Legal Aspects

Science and uncertainty: a jurist's view, 7:5332

ROADWAY-POWERED ELECTRIC VEHICLES

Economics

Future of electricity for automobiles: advanced electric vehicle concepts, 7:5431 (UCRL—85526)

Technology Assessment

Future of electricity for automobiles: advanced electric vehicle concepts, 7:5431 (UCRL—85526)

RURAL AREAS

Energy Source Development

Energy development in the western United States: impact on rural areas (Book), 7:5322

Power Demand

Empirical investigation of the rural cooperatives residential demand for electricity, 7:5565 (CONF-810744—1)

SAFETY*See also REACTOR SAFETY***Cost Benefit Analysis**

Three challenges of risk-benefit assessment, 7:5340

SAFETY STANDARDS

Regulation of the transportation of hazardous materials: a critique and a proposal, 7:5342

SALES*See TRADE***SANITARY LANDFILLS****Gas Yields**

Development of a case study for the Cinnaminson landfill methane recovery operation, 7:5637 (ANL/CNSV-TM-73)

SAUDI ARABIA**Petroleum**

Optimal oil-pricing policy for Saudi Arabia, 7:5549

SCHOOL BUILDINGS**Solar Water Heating**

Evaluation of solar water heating and solar active cooling in New Mexico. Final report, 7:5652

SCRAP METALS**Prices**

Analysis of the recycling coefficients of non-ferrous metals in the US economy, 1959-1976, 7:5369

SEA BED**Mining Laws**

Interim deep-seabed mining legislation: an international environmental perspective, 7:5368

SEAS**Carbon Sinks**

Response of the oceans to increasing atmospheric carbon dioxide, 7:5331 (ORAU/IEA-81-6(M))

SEAWATER**Uranium**

Present status and problems on extraction of uranium from seawater, 7:5405

SENIOR CENTERS*See PUBLIC BUILDINGS***SERVICE SECTOR****Employment**

Toward a service-oriented growth strategy, 7:5293

SEVERANCE TAX**Lawsuits**

Tribal severance taxes: outside the purview of the commerce clause, 7:5469

SITE SELECTION**Public Opinion**

People and petrochemicals: siting controversies on the urban waterfront, 7:5316

SLURRIES (FUEL)*See FUEL SLURRIES***SOCIOLOGY**

Energy use and social structure in a Bangladesh village, 7:5294

SOLAR AIR CONDITIONERS**Economic Analysis**

Systems simulation and economic analysis for active solar cooling, 7:5662 (LBL-12752)

SOLAR AIR CONDITIONING**Cost**

Supply problems in the solar heating and cooling industry. Final report, 7:5659 (EPRI-EA-1957)

Economic Analysis

Macroeconomic and social impacts of solar energy development, 7:5305

Environmental Impacts

Macroeconomic and social impacts of solar energy development, 7:5305

Marketing

Supply problems in the solar heating and cooling industry. Final report, 7:5659 (EPRI-EA-1957)

Mathematical Models

Macroeconomic and social impacts of solar energy development, 7:5305

Socio-Economic Factors

Macroeconomic and social impacts of solar energy development, 7:5305

Technology Assessment

Solar Technology Assessment Project. Volume IV. Solar air conditioning: active, hybrid and passive, 7:5641 (DOE/CS/30278-T5)

SOLAR CELLS**Technology Assessment**

Solar Technology Assessment Project. Volume VI. Photovoltaic technology assessment, 7:5645 (DOE/CS/30278-T9)

SOLAR COOLING SYSTEMS*See also SOLAR AIR CONDITIONERS***Economic Analysis**

Evaluation of solar water heating and solar active cooling in New Mexico. Final report, 7:5652

Information Dissemination

Seminars for private college administrators on solar applications for college buildings, 7:5663 (MASEC-CF-81-038)

Technology Assessment

Evaluation of solar water heating and solar active cooling in New Mexico. Final report, 7:5652

SOLAR ENERGY**Commercialization**

Financing solar energy: state policy options, 7:5683

Japan's unique energy situation, 7:5489

Solar Technology Assessment Project. Volume XII. State and community commercialization issues, 7:5649 (DOE/CS/30278-T14)

Demonstration Programs

Program summary, 7:5430 (TVA/OP/ECR-81-19)

Institutional Factors

Access rights for the solar user: in search of the best statutory approach, 7:5486

Legal Aspects

Solar energy and the law, 7:5483

Legislation

Case studies in state solar legislation, 7:5467

State legislation: abstracts, 7:5468

SOLAR ENERGY CONVERSION**Economics**

Direct energy conversion: an attractive option for developing countries, 7:5651

SOLAR HEATING SYSTEMS*See also PASSIVE SOLAR HEATING SYSTEMS***Design**

Solar-wood stove domestic heating systems. Final report, 7:5656 (DOE/SF/01952-T1)

Information Dissemination

Seminars for private college administrators on solar applications for college buildings, 7:5663 (MASEC-CF-81-038)

Technology Assessment

Solar Technology Assessment Project. Volume III. Active space heating and hot water supply with solar energy, 7:5647 (DOE/CS/30278-T12)

Testing

Solar-wood stove domestic heating systems. Final report, 7:5656 (DOE/SF/01952-T1)

SOLAR INDUSTRY**Directories**

Oregon Solar Business Directory, 7:5674 (WSUN-75)

Employment

Meeting the solar energy industry's labor needs, 7:5685

Financial Incentives

Financing solar energy: state policy options, 7:5683

Marketing

Supply problems in the solar heating and cooling industry. Final report, 7:5659 (EPRI-EA-1957)

Reviews

Solar Technology Assessment Project. Volume XI. The solar industry in the United States: its status and prospects, 1981, 7:5644 (DOE/CS/30278-T8)

SOLAR PROCESS HEAT

Technology Assessment

Solar Technology Assessment Project. Volume V. Solar industrial process heat, 7:5643 (DOE/CS/30278—T7)

SOLAR SPACE HEATING

Cost

Supply problems in the solar heating and cooling industry. Final report, 7:5659 (EPRI-EA—1957)

Economic Analysis

Macroeconomic and social impacts of solar energy development, 7:5305
Microeconomics of solar energy, 7:5306

Environmental Impacts

Macroeconomic and social impacts of solar energy development, 7:5305

Marketing

Supply problems in the solar heating and cooling industry. Final report, 7:5659 (EPRI-EA—1957)

Mathematical Models

Macroeconomic and social impacts of solar energy development, 7:5305

Optimization

Microeconomics of solar energy, 7:5306

Socio-Economic Factors

Macroeconomic and social impacts of solar energy development, 7:5305

Technology Assessment

Solar Technology Assessment Project. Volume III. Active space heating and hot water supply with solar energy, 7:5647 (DOE/CS/30278—T12)

SOLAR THERMAL POWER PLANTS

See also TOWER FOCUS POWER PLANTS

Economic Analysis

Regional assessment of solar thermal energy, 7:5668 (SERI/CP—633-1145)

Regional Analysis

Regional assessment of solar thermal energy, 7:5668 (SERI/CP—633-1145)

SOLAR WATER HEATERS

Design

Solar project description for living systems single family residence, Davis, California, 7:5673 (SOLAR/1046—81/50)

Operation

Evaluation of solar water heating and solar active cooling in New Mexico. Final report, 7:5652

Technology Assessment

Solar Technology Assessment Project. Volume III. Active space heating and hot water supply with solar energy, 7:5647 (DOE/CS/30278—T12)

SOLAR WATER HEATING

Economic Analysis

Macroeconomic and social impacts of solar energy development, 7:5305
Microeconomics of solar energy, 7:5306

Environmental Impacts

Macroeconomic and social impacts of solar energy development, 7:5305

Mathematical Models

Macroeconomic and social impacts of solar energy development, 7:5305

Optimization

Microeconomics of solar energy, 7:5306

Socio-Economic Factors

Macroeconomic and social impacts of solar energy development, 7:5305

SOUTH CAROLINA

Legislation

Case studies in state solar legislation, 7:5467

SOVIET UNION

See USSR

SPECIES DIVERSITY

Resource Depletion

Exhausted earth, 7:5366

SPENT FUEL STORAGE

IAEA Safeguards

International safeguards for spent fuel storage, 7:5390 (ORNL/SUB—7605/12-2)

STANDARDS

See also ENERGY EFFICIENCY STANDARDS
SAFETY STANDARDS

Government Policies

Who will set the standards for groups that set industry product standards, 7:5438

Lawsuits

Court overrules insulation standard set by Pennsylvania utility, 7:5435

Management

Who will set the standards for groups that set industry product standards, 7:5438

STANDARDS (SAFETY)

See SAFETY STANDARDS

STANDING CROP

See BIOMASS

STATE GOVERNMENT

Decision Making

Need for power and the choice of technologies: state decisions on electric power facilities, 7:5568 (DOE/EP/10004—1)

Legislation

State legislation: abstracts, 7:5468

STEAM GENERATION

See also COGENERATION

Fuel Substitution

Economic desirability of using wood as a fuel for steam production, 7:5682

STORAGE (SPENT FUEL)

See SPENT FUEL STORAGE

STOVER

See AGRICULTURAL WASTES

STRATEGIC PETROLEUM RESERVE

Attitudes

Strategic Petroleum Reserve: an economic perspective, 7:5531

Economic Analysis

Strategic Petroleum Reserve: an economic perspective, 7:5531

Size

DOE analysis of the appropriate size of the strategic petroleum reserve, 7:5503 (DOE/US—31017)

STRATOSPHERE

Reaganites, with OMB's list in hand, take dead aim at EPA's regulations, 7:5470

SUGAR CANE

Harvesting

Harvesting of close-spaced short-rotation woody biomass, 7:5653 (DOE/ET/23133—T2)

SULFUR DIOXIDE

Deregulation

Reaganites, with OMB's list in hand, take dead aim at EPA's regulations, 7:5470

Ecological Concentration

Acid rain fallout threatens subsidies for utilities that convert to coal, 7:5490

SURFACE MINING ACTS

Intergovernmental Cooperation

Regulation of coal surface mining in a Federal system, 7:5527

SUSPENSIONS (FUEL)

See FUEL SLURRIES

SWEDEN

Hydroelectric Power

Conservationists cause hesitation in development of Swedish hydroelectric power, 7:5680

SYNTHETIC FUELS

See also ALCOHOL FUELS

Cost

Impact of environmental control costs on an indirect coal liquefaction process, 7:5510 (ORNL—5722)

Prices

Impact of environmental control costs on an indirect coal liquefaction process, 7:5510 (ORNL—5722)

Production

Potential supply of synthetic fuels from Alaskan hydroelectric power and coal, 7:5560 (BNL—29764)

TAIWAN**Economic Development**

Taiwan (Book chapter), 7:5482

Energy Policy

Taiwan (Book chapter), 7:5482

TAR SANDS*See OIL SANDS***TECHNOLOGY ASSESSMENT****Decision Making**

Decision theoretic model of Congressional technology assessment: a theoretical examination of the characteristics of complete assessment reports, with applications, 7:5379

Mathematical Models

Measuring technological bias, 7:5492

TECHNOLOGY TRANSFER*See also COMMERCIALIZATION***Economic Impact**

Taking technology to market, 7:5378

Institutional Factors

Who will set the standards for groups that set industry product standards, 7:5438

Marketing

Taking technology to market, 7:5378

TECHNOLOGY UTILIZATION*See also COMMERCIALIZATION***Energy Consumption**

United States (Book chapter), 7:5475

Legal Aspects

Science and uncertainty: a jurist's view, 7:5332

Risk Assessment

Science and uncertainty: a jurist's view, 7:5332

Three challenges of risk-benefit assessment, 7:5340

TENNESSEE VALLEY AUTHORITY**Research Programs**

Program summary, 7:5430 (TVA/OP/ECR—81-19)

TERRITORIAL WATERS**Legal Aspects**

Delineation of offshore areas: hard labour and bitter fruits at UNCLOS III, 7:5335

THERMAL ENERGY STORAGE EQUIPMENT**Off-Peak Energy Storage**

Off-peak storage heating: the British experience, 7:5409

THERMAL INSULATION**Standards**

Court overrules insulation standard set by Pennsylvania utility, 7:5435

THERMAL STORAGE*See HEAT STORAGE***THERMODYNAMICS**

Second-law analysis: an alternative indicator of system efficiency, 7:5283

THERMONUCLEAR WEAPONS*See NUCLEAR WEAPONS***TIME-OF-DAY PRICING***See PEAK-LOAD PRICING***TIME-OF-USE PRICING**

Cost and rates: marginal cost, 7:5578 (NP—22596)

Customer response (At Pacific Gas and Electric Co.), 7:5590 (NP—22596)

Time-of-use rate studies with residential customers (By Research Triangle Inst.), 7:5589 (NP—22596)

Attitudes

Customer attitudes (Surveys by Elrick and Lavidge, Inc.), 7:5588 (NP—22596)

TOOLS (EDUCATIONAL)*See EDUCATIONAL TOOLS***TOWER FOCUS POWER PLANTS****Economic Analysis**

Economic assessment of advanced central-receiver solar-thermal power systems. Executive summary, 7:5657 (DOE/SF/10601—0)

Solar Technology Assessment Project. Volume IX. Heliostat systems: technical and economic assessment, 7:5648 (DOE/CS/30278—T13)

Technology Assessment

Economic assessment of advanced central-receiver solar-thermal power systems. Executive summary, 7:5657 (DOE/SF/10601—0)

Solar Technology Assessment Project. Volume IX. Heliostat systems: technical and economic assessment, 7:5648 (DOE/CS/30278—T13)

TOXIC MATERIALS**Deregulation**

Reaganites, with OMB's list in hand, take dead aim at EPA's regulations, 7:5470

Research Programs

Chemical Testing and Assessment Research Committee - research strategy 1979-1985, 7:5333 (PB—81-121105)

TRADE*See also COMMERCIAL SECTOR*
*NUCLEAR TRADE***Government Policies**

Influence of trade and commercial barriers on the industrial processing of natural resources, 7:5303

TRAINS*See also RAILWAYS***Economics**

Rate structure of unit coal trains in the 1970s, 7:5410

Rate Structure

Rate structure of unit coal trains in the 1970s, 7:5410

TRANSFRONTIER POLLUTION**Global Aspects**

Managing nuclear wastes: the international connection, 7:5397

International Cooperation

Making pollution prevention pay (Includes Bibliography of No-Waste Technology), 7:5328

TRANSMISSION LINES*See POWER TRANSMISSION LINES***TRANSPORTATION SECTOR****Energy Conservation**

Role of local government in energy policy (Book chapter), 7:5485

Fuel Substitution

Gasohol, economics, and passenger-transportation policy, 7:5561

Gasohol

Gasohol, economics, and passenger-transportation policy, 7:5561

TRANSPORTATION SYSTEMS*See also BUSES**MASS TRANSIT SYSTEMS***Civil Liability**

Regulation of the transportation of hazardous materials: a critique and a proposal, 7:5342

Energy Conservation

Balanced urban ground-passenger transportation with respect to energy, demand, and income: an approach for bus-transit supply-system planning, 7:5443

Environmental Impacts

Noise pollution in urban ghettos: assessment, issues and challenges, 7:5351

Safety Standards

Regulation of the transportation of hazardous materials: a critique and a proposal, 7:5342

TREES**Harvesting**

Harvesting of close-spaced short-rotation woody biomass, 7:5653 (DOE/ET/23133—T2)

TRINIDAD AND TOBAGO**Oil Fields**

Venezuela, Trinidad and Tobago: crude oil potential from known deposits, 7:5499 (DOE/EIA—0297)

Petroleum Deposits

Venezuela, Trinidad and Tobago: crude oil potential from known deposits, 7:5499 (DOE/EIA—0297)

TRITICUM*See WHEAT***TROPICAL REGIONS****Resource Conservation**

Exhausted earth, 7:5366

TRUCKS

Deregulation

Reaganites, with OMB's list in hand, take dead aim at EPA's regulations, 7:5470

Fuel Consumption

National Interim Energy-Consumption Survey. Part IV. Transportation panel. Including Appendices A through C, 7:5627 (DOE/EIA/10085—T1(Pt.4))
National Interim Energy-Consumption Survey. Part V. Transportation panel. Appendices D through H, 7:5628 (DOE/EIA/10085—T1(Pt.5))

TURKEY

Energy Policy

Models for national energy policy analysis and planning, 7:5457

U

UCLLL

See LAWRENCE LIVERMORE LABORATORY

UNDERGROUND BUILDINGS

See EARTH-COVERED BUILDINGS

UNITED KINGDOM

Energy Demand

Gas demand in severe weather: aspects of forecasting and planning, 7:5532

Energy Policy

Energy: why planners must be involved, 7:5472

Natural Gas

Gas demand in severe weather: aspects of forecasting and planning, 7:5532

Power Demand

Electricity demand forecasting: realism at last, 7:5618

UNITED STATES OF AMERICA

See USA

URANIUM

Extraction

Present status and problems on extraction of uranium from seawater, 7:5405

URBAN AREAS

Environmental Policy

Policies for energy facility siting on the urban coast, 7:5320

Resource Conservation

Urban ecosystem and resource-conserving urbanism in Third World cities, 7:5357 (LBL—12640)

Socio-Economic Factors

Refining the waterfront. Alternative energy facility siting policies for urban coastal areas, 7:5314

US DOE

See also ANL

LAWRENCE LIVERMORE LABORATORY

Management

DOE Property Management Regulations, 7:5274 (DOE/MA—0021)

Radioactive Waste Management

INFx guide: summary of US DOE plans and policies for international cooperation in the field of radioactive waste management, 7:5393 (PNL—3774)

Regulations

DOE Property Management Regulations, 7:5274 (DOE/MA—0021)

Research Programs

Long-term biomass research, 7:5679
Status of the DOE battery and electrochemical technology program II, 7:5377 (DOE/ET/25407—1)

US EPA

Environmental Policy

EPA's emission offset policy and energy facility siting, 7:5354

Regulations

Reaganites, with OMB's list in hand, take dead aim at EPA's regulations, 7:5470

US NRC

Management

Further evaluation of the proposed interim consolidation of the Nuclear Regulatory Commission, 7:5385 (EMD—81-76)

USA

(For national information only. See individual states for specific references.)

See also APPALACHIA
VIRGINIA

Economy

Analysis of the recycling coefficients of non-ferrous metals in the US economy, 1959-1976, 7:5369

Energy Policy

Role of large scale energy systems models in R and D planning, 7:5376 (BNL—29751)

Energy Source Development

Alternative energy technologies: blueprint for the future, 7:5453

Energy for America (Book), 7:5687

Land use and energy, 7:5324 (ANL/AA—19)

Near-term goals for alcohol fuels from biomass: an overview of resource requirements, land use, environmental, and socioeconomic impacts, 7:5638 (ANL/EES-TM—149)

Energy Supplies

Rising energy prices: what's good for some states is bad for others, 7:5286

Role of large scale energy systems models in R and D planning, 7:5376 (BNL—29751)

Hydroelectric Power Plants

Hypdropower sites of the United States developed and undeveloped: river basin maps showing site locations (conventional, pumped storage, retired), 7:5571 (DOE/TIC—1029964)

Industry

Capacity strategies for the 1980s (Economic analysis essential), 7:5308

Nuclear Industry

Statistical data of the uranium industry, 7:5388 (GJO—01664)

Nuclear Weapons

Strategic offensive nuclear forces of the United States: a linear-programming model, 7:5406

Petroleum Industry

American petroleum problems and the future outlook, 7:5557
Washington legislative outlook on energy, 7:5553

Power Demand

Capability of US to meet demand causes concern, 7:5616

Power Generation

Capability of US to meet demand causes concern, 7:5616

Pumped Storage Power Plants

Hypdropower sites of the United States developed and undeveloped: river basin maps showing site locations (conventional, pumped storage, retired), 7:5571 (DOE/TIC—1029964)

Rural Areas

Energy development in the western United States: impact on rural areas (Book), 7:5322

Water Resources

United States v. New Mexico: purposes that hold no water, 7:5375

USSR

Energy Policy

Soviet Union (Book chapter), 7:5476

Environmental Policy

Soviet Union (Book chapter), 7:5476

UTILITIES

See ELECTRIC UTILITIES

GAS UTILITIES

PUBLIC UTILITIES

V

VANPOOLING

Information Systems

Ridesharing and the database management system, 7:5281 (UCRL—86543)

VAPORS

Deregulation

Reaganites, with OMB's list in hand, take dead aim at EPA's regulations, 7:5470

VENEZUELA**Economy**

User's guide to the Venezuelan macrofinancial model, 7:5296 (MIT-EL—81-009)

Oil Fields

Venezuela, Trinidad and Tobago: crude oil potential from known deposits, 7:5499 (DOE/EIA—0297)

Petroleum Deposits

Venezuela, Trinidad and Tobago: crude oil potential from known deposits, 7:5499 (DOE/EIA—0297)

VERTICAL INTEGRATION**Mathematical Models**

Business performance and vertical integration, 7:5290 (CONF-800820—13)

VIRGINIA**Coastal Regions**

Institutional purpose and the management of Virginia's coastal wetlands, 7:5374

Wetlands

Institutional purpose and the management of Virginia's coastal wetlands, 7:5374

VISIBILITY**Environmental Policy**

Economics of visibility protection: on a clear day you can see a policy, 7:5338

VOLTAIC CELLS

See *ELECTRIC BATTERIES*

W**WASTE HEAT UTILIZATION****Coordinated Research Programs**

Rational use of energy helps saving. Waste heat from industrial processes and refuse destruction, 7:5418

Experiment Planning

Residual-energy-application program: EAST -facility requirements document, 7:5413 (DOE/ET/12866—8-Vol.1)

WASTE MANAGEMENT

See also *RADIOACTIVE WASTE MANAGEMENT*

Environmental quality and residuals management, 7:5323

WASTE-FUELED POWER PLANTS

See *REFUSE-FUELED POWER PLANTS*

WATER

See also *GROUND WATER*

SEAWATER**Resource Conservation**

Reducing consumption in periods of acute scarcity: the case of water, 7:5360

WATER DISTRIBUTION

See *WATER SUPPLY*

WATER HEATERS

See also *ANNUAL CYCLE ENERGY SYSTEM*

SOLAR WATER HEATERS**Design**

Solar-wood stove domestic heating systems. Final report, 7:5656 (DOE/SF/01952—T1)

Remote Control

Load control at Detroit Edison, 7:5586 (NP—22596)

Testing

Solar-wood stove domestic heating systems. Final report, 7:5656 (DOE/SF/01952—T1)

WATER POLLUTION**Deregulation**

Reaganites, with OMB's list in hand, take dead aim at EPA's regulations, 7:5470

WATER POLLUTION CONTROL**Cost Benefit Analysis**

The benefits of air and water pollution control: a review and synthesis of recent estimates. Executive summary, 7:5334 (PB—81-123838)

WATER REQUIREMENTS**Legal Aspects**

Effect of water law on the development of oil shale, 7:5535

WATER RESOURCES**Allocations**

United States v. New Mexico: purposes that hold no water, 7:5375

Government Policies

If there's a national water crisis, you can't tell it in Washington, 7:5362

Public Policy

Developing a national water policy: problems and perspectives on reform, 7:5367

WATER RIGHTS**Government Policies**

Developing a national water policy: problems and perspectives on reform, 7:5367

Non-Indian federal-reserved water rights, 7:5370

Legal Aspects

Recent Developments in Colorado groundwater law, 7:5371
Water-rights-transfer evaluation procedure with applications for Western energy development, 7:5358 (MIT-EL—79-019)

WATER SUPPLY**Resource Conservation**

If there's a national water crisis, you can't tell it in Washington, 7:5362

WATER TREATMENT PLANTS**Deregulation**

Reaganites, with OMB's list in hand, take dead aim at EPA's regulations, 7:5470

WEAPONS

See also *LASER WEAPONS*

NUCLEAR WEAPONS**International Laws**

Directed-energy weapons: a juridical analysis (Book), 7:5396

WELL DRILLING**Taxes**

Recapture of intangible drilling and development costs: a discussion of the proposed regulations, 7:5291

WEST GERMANY

See *FEDERAL REPUBLIC OF GERMANY*

WHEAT**Cartels**

Bushel of wheat for a barrel of oil: can we offset OPEC's gains with a grain cartel, 7:5507

WIND POWER**Resource Assessment**

Wind power for developing nations, 7:5672 (SERI/TR—762-966)

WIND TURBINES**Legal Aspects**

Wind energy conversion, 7:5684

Specifications

Wind power for developing nations, 7:5672 (SERI/TR—762-966)

Technology Assessment

Wind energy conversion, 7:5684

WINDFALL PROFITS TAX**Economic Impact**

Incidence and effects of the crude oil Windfall Profit Tax, 7:5528

WIND-POWERED PUMPS**Specifications**

Wind power for developing nations, 7:5672 (SERI/TR—762-966)

WISCONSIN**Energy Consumption**

Earth-sheltered industrial utility park. Final report, 7:5423 (DOE/R5/10248—T1)

Gas Utilities

Natural gas rate design in Wisconsin, 7:5546

WOOD**Boiler Fuels**

Economic desirability of using wood as a fuel for steam production, 7:5682

Fuel Substitution

Economic desirability of using wood as a fuel for steam production, 7:5682

WOOD BURNING APPLIANCES

Design

Solar-wood stove domestic heating systems. Final report,
7:5656 (DOE/SF/01952—T1)

Testing

Solar-wood stove domestic heating systems. Final report,
7:5656 (DOE/SF/01952—T1)

WOOD FUELS

Economic Impact

Individual biomass facility reports supplement to some
employment and earnings implications of regional biomass
energy utilization: New England and the cornbelt states,
7:5664 (ORAU—181B)

WOOD PRODUCTS INDUSTRY

Resource Depletion

Nation's ailing timber industry finds it has a friend in
Washington, 7:5363

WOOD-FUEL POWER PLANTS

Fuel Supplies

Evaluating feedstock requirements for a 50-megawatt wood-
fired electric-generating unit, 7:5681

WYOMING

Mining Laws

Surface owner's estate becomes dominant: Wyoming's surface
owner consent statute, 7:5539

Water Resources

Water-rights-transfer evaluation procedure with applications
for Western energy development, 7:5358 (MIT-EL—79-019)

REPORT NUMBER INDEX

The numbers assigned to all reports cited in the publication appear in the first column of the index. The citation numbers are included in the second column. Cross reference information and/or availability are included as appropriate. Abbreviations used in the availability column are elaborated at the end of the index. To expedite the filling of orders for reports from NTIS and TIC, an order number in the form, DE81000001, is appended to the availability statement. Requesters are urged to use this order number where provided. Following the order number, one or more DOE distribution categories are indicated, e.g., STD-10, MN-25. STD indicates distribution was made in full size copy; MN indicates microcopy distribution. These category numbers are included to assist DOE librarians in responding to requests for reports in their collections. The UC (Unclassified Distribution Categories) are defined in DOE/TIC-4500, available from TIC.

Report No.	Abstract No.	Availability
AD-A-		
091569	7:5446	NTIS, PC A09/MF A01
ANL/AA-		
19	7:5324	NTIS, PC A09/MF A01, Order Number DE81028475, Distribution Category MN -13
ANL/CNSV-TM-		
67	7:5411	NTIS, PC A07/MF A01, Order Number DE81025869, Distribution Category MN -95d
70	7:5447	NTIS, PC A09/MF A01, Order Number DE81027033, Distribution Category MN -98F
73	7:5637	NTIS, PC A04/MF A01, Order Number DE81029988, Distribution Category MN -95e
76	7:5564	NTIS, PC A03/MF A01, Order Number DE81029991, Distribution Category MN -97d
ANL/EES-TM-		
149	7:5638	NTIS, PC A06/MF A01, Order Number DE81029987, Distribution Category MN -61a
BNL-		
29520	7:5559	NTIS, PC A02/MF A01, Order Number DE81021383, Distribution Category MN -94d
29747	7:5288	NTIS, PC A04/MF A01, Order Number DE81026048, Distribution Category MN -98F
29751	7:5376	NTIS, PC A02/MF A01, Order Number DE81026058, Distribution Category MN -13
29764	7:5560	NTIS, PC A02/MF A01, Order Number DE81025743, Distribution Category MN -90
29773	7:5493	NTIS, PC A03/MF A01, Order Number DE81028335, Distribution Category MN -90e
29881	7:5289	NTIS, PC A03/MF A01, Order Number DE81028465, Distribution Category MN -98F
51208	7:5494	NTIS, PC A07/MF A01, Order Number DE81030143, Distribution Category STD -95c
51314	7:5495	NTIS, PC A09/MF A01, Order Number DE81030146, Distribution Category STD -92a
CONF-7906130-		(Conference on energy and environment, Garden City, NY, USA, 8 Jun 1979)
	7:5344	Lexington, MA; D.C. Heath and Company (1981).

Report No.	Abstract No.	Availability
CONF-7911141-		(International business conference on world energy outlook, St Louis, MO, USA, 16 Nov 1979)
	7:5551	Saint Louis, MO; Saint Louis University (1979).
CONF-8004162-		(Symposium on energy efficiency and the utilities: new directions, Stanford, CA, USA, 18-19 Apr 1980)
	7:5605	San Francisco, CA; California Public Utilities Commission (1980).
CONF-8005161-		(Rate design study regional conference, San Francisco, CA, USA, May 1980)
	7:5297	See NP-22596
	7:5575	See NP-22596
	7:5576	See NP-22596
	7:5577	See NP-22596
	7:5578	See NP-22596
	7:5579	See NP-22596
	7:5580	See NP-22596
	7:5581	See NP-22596
	7:5582	See NP-22596
	7:5583	See NP-22596
	7:5584	See NP-22596
	7:5585	See NP-22596
	7:5586	See NP-22596
	7:5587	See NP-22596
	7:5588	See NP-22596
	7:5589	See NP-22596
	7:5590	See NP-22596
	7:5591	See NP-22596
	7:5592	See NP-22596
	7:5593	See NP-22596
	7:5594	See NP-22596
	7:5595	See NP-22596
	7:5596	See NP-22596
	7:5597	See NP-22596
	7:5598	See NP-22596
	7:5599	See NP-22596
	7:5600	See NP-22596
CONF-800820-		(American Statistical Society meeting, Houston, TX, USA, 11-14 Aug 1980)
	13	NTIS, PC A02/MF A01, Order Number DE81028531, Distribution Category MN -13
CONF-8010129-		(Solar central receiver semi-annual meeting, San Francisco, CA, USA, 15 Oct 1980)
	7:5665	See SAND-80-8049
CONF-801126-		(ORSA/TIMS joint national meeting, Colorado Springs, CO, USA, 9-12 Nov 1980)
	3	See BNL-29751
CONF-810542-		(Joint meeting of the Institute of Management Sciences and Operations Research Society, Toronto, Canada, 6 May 1981)
	5	See BNL-29881
CONF-810545-		(3. conference on waste heat management and utilization, Miami, FL, USA, 12 May 1981)
	6	See PNL-SA-9164
CONF-8105107-		(Symposium on energy and big building design, Philadelphia, PA, USA, 25-26 May 1981)
	1	See LA-UR-81-2288
CONF-810674-		(1981 international conference on residential solid fuels, Portland, OR, USA, 1-5 Jun 1981)
	2	See BNL-29773
CONF-8106137-		(WATERPOWER 1981 conference, Washington, DC, USA, 22-24 Jun 1981)
	1	NTIS, PC A02/MF A01, Order Number DE81027817, Distribution Category MN -97e
CONF-810726-		(9. international conference on operational research, Hamburg, F.R. Germany, 23 Jul 1981)
	2	See BNL-29747

Report No.	Abstract No.	Availability	Report No.	Abstract No.	Availability
CONF-810744-		(American Association of Agricultural Economists annual meeting, Clemson, SC, USA, 26-29 Jul 1981)	T14	7:5649	NTIS, PC A04/MF A01. Order Number DE81029087, Distribution Category MN -59
1	7:5565	NTIS, PC A03/MF A01. Order Number DE81026521, Distribution Category MN -97c	T16	7:5650	NTIS, PC A04/MF A01. Order Number DE81029003, Distribution Category MN -59
CONF-810802-		(Conference on new and renewable energy sources, Nairobi, Kenya, Aug 1981)	DOE/CS/40059-T1	7:5421	NTIS, PC A06/MF A01. Order Number DE81029027, Distribution Category MN -61a
2	7:5639	NTIS, PC A05/MF A01. Order Number DE81028867, Distribution Category STD -98D	DOE/CS/50069-T1	7:5422	NTIS, PC A06/MF A01. Order Number DE81029834, Distribution Category MN -96
CONF-810812-		(IECEC conference, Atlanta, GA, USA, 9-14 Aug 1981)	DOE/CS/50189-T1	7:5448	NTIS, PC A05/MF A01. Order Number DE81027485, Distribution Category STD -96
32	7:5420	NTIS, PC A02/MF A01. Order Number DE81028570, Distribution Category MN -95d	DOE/EIA-0185-80	7:5496	NTIS, PC A09/MF A01. Order Number DE81029785, Distribution Category STD -13
CONF-810832-		(DOE passive and hybrid solar energy program update, Washington, DC, USA, 9-12 Aug 1981)	0206-79	7:5497	NTIS, PC A06/MF A01. Order Number DE81028468, Distribution Category MN -13
5	7:5640	NTIS, PC A02/MF A01. Order Number DE81028573, Distribution Category MN -59c	0239-80	7:5498	NTIS, PC A03/MF A01. Order Number DE81029909, Distribution Category STD -92
CONF-810838-		(Conference on oil shale, the environmental challenges II, Vail, CO, USA, 10-13 Aug 1981)	0278	7:5381	NTIS, PC A15/MF A01. Order Number DE81027671, Distribution Category STD -13
1	7:5509	See LA-UR-81-2309	0295/ 1	7:5624	See DOE/EIA/10085-T1(Pt.1)
CONF-810912-		(Active contractors' review meeting, Washington, DC, USA, Sep 1981)	0295/ 2	7:5625	See DOE/EIA/10085-T1(Pt.2)
12	7:5662	See LBL-12752	0295/ 3	7:5626	See DOE/EIA/10085-T1(Pt.3)
CONF-810925-		(6. national passive conference, Portland, OR, USA, 8-12 Sep 1981)	0295/ 4	7:5627	See DOE/EIA/10085-T1(Pt.4)
7	7:5661	See LA-UR-81-2200	0295/ 5	7:5628	See DOE/EIA/10085-T1(Pt.5)
9	7:5669	See SERI/TP-721-1300	0295/ 6	7:5629	See DOE/EIA/10085-T1(Pt.6)
11	7:5631	See SERI/TP-721-1316	0297	7:5499	NTIS, PC A07/MF A01. Order Number DE81027023, Distribution Category STD -92
12	7:5670	See SERI/TP-721-1325	DOE/EIA/10085-T1(Pt.1)	7:5624	NTIS, PC A05/MF A01. Order Number DE81026311, Distribution Category MN -98G
14	7:5671	See SERI/TP-721-1326	T1(Pt.2)	7:5625	NTIS, PC A14/MF A01. Order Number DE81026310, Distribution Category MN -98G
CONF-810933-		(IGRC 1981 conference, Chicago, IL, USA, 28-29 Sep 1981)	T1(Pt.3)	7:5626	NTIS, PC A08/MF A01. Order Number DE81026080, Distribution Category MN -98G
1	7:5560	See BNL-29764	T1(Pt.4)	7:5627	NTIS, PC A07/MF A01. Order Number DE81026079, Distribution Category MN -98G
CONF-811006-		(International conference on energy use management-III, West Berlin, F.R. Germany, 26-30 Oct 1981)	T1(Pt.5)	7:5628	NTIS, PC A09/MF A01. Order Number DE81027604, Distribution Category MN -98G
1	7:5330	See LA-UR-81-899	T1(Pt.6)	7:5629	NTIS, PC A12/MF A01. Order Number DE81027605, Distribution Category MN -98G
CONF-811007-		(2. world congress of chemical engineering, Montreal, Canada, 4-9 Oct 1981)	DOE/EIA/10752-T2	7:5272	NTIS, PC A02/MF A01. Order Number DE81026208, Distribution Category MN -13
5	7:5559	See BNL-29520	DOE/EP-0021	7:5326	NTIS, PC A02/MF A01. Order Number DE81027695, Distribution Category STD -11
CONF-811010-		(6. electric vehicle council symposium, Baltimore, MD, USA, 21-23 Oct 1981)	DOE/EP/10004-1	7:5568	NTIS, PC A10/MF A01. Order Number DE81025960, Distribution Category STD -97b
3	7:5431	See UCRL-85526	DOE/ET/10033-T1	7:5500	NTIS, PC A08/MF A01. Order Number DE81028708, Distribution Category STD -88
CONF-811015-		(Geothermal Resources Council annual meeting, Houston, TX, USA, 25-29 Oct 1981)	DOE/ET/12866-5	7:5327	NTIS, PC A03/MF A01. Order Number DE81027538, Distribution Category MN -12
4	7:5666	See SAND-81-1490C	8-Vol.1	7:5413	NTIS, PC A05/MF A01. Order Number DE81027536, Distribution Category MN -12
COO-4916			8-Vol.2	7:5414	NTIS, PC A11/MF A01. Order Number DE81027489, Distribution Category MN -12
DOE/CE-0007	7:5421	See DOE/CS/40059-T1			
DOE/CE/10328-1	7:5567	NTIS, PC A07/MF A01. Order Number DE81026903, Distribution Category STD -97b			
DOE/CS/30278-T5	7:5412	NTIS, PC A04/MF A01. Order Number DE81028116, Distribution Category MN -95			
T6	7:5641	NTIS, PC A04/MF A01. Order Number DE81029005, Distribution Category MN -59			
T7	7:5643	NTIS, PC A07/MF A01. Order Number DE81029008, Distribution Category MN -59			
T8	7:5644	NTIS, PC A03/MF A01. Order Number DE81029030, Distribution Category MN -59			
T9	7:5645	NTIS, PC A03/MF A01. Order Number DE81029007, Distribution Category MN -59			
T11	7:5646	NTIS, PC A04/MF A01. Order Number DE81029011, Distribution Category MN -59			
T12	7:5647	NTIS, PC A03/MF A01. Order Number DE81029004, Distribution Category MN -59			
T13	7:5648	NTIS, PC A05/MF A01. Order Number DE81029010, Distribution Category MN -59			

Report No.	Abstract No.	Availability	Report No.	Abstract No.	Availability
DOE/ET/23133-T2	7:5653	NTIS, PC A06/MF A01. Order Number DE81027314, Distribution Category MN -61a	GA-A- 16272	7:5386	NTIS, PC A03/MF A01. Order Number DE81027932, Distribution Category MN -20f
DOE/ET/25407-1	7:5377	NTIS, PC A13/MF A01. Order Number DE81029879, Distribution Category MN -94c	GJO- 01664	7:5388	NTIS, PC A05/MF A01. Order Number DE81026863, Distribution Category MN -51
DOE/ET/27194-T4	7:5654	NTIS, PC A10/MF A01. Order Number DE81026878, Distribution Category MN -66h	LA- 8889-MS	7:5660	NTIS, PC A07/MF A01. Order Number DE81026309, Distribution Category STD -59c
DOE/ET/29372-1	7:5655	NTIS, PC A07/MF A01. Order Number DE81028371, Distribution Category MN -97c	8936	7:5508	NTIS, PC A02/MF A01. Order Number DE81028379, Distribution Category STD -91
DOE/ET/46608-1	7:5383	NTIS, PC A11/MF A01. Order Number DE81026818, Distribution Category MN -70	LA-UR- 81-899	7:5330	NTIS, PC A02/MF A01. Distribution Category MN -11
DOE/EV/01340-1	7:5329	NTIS, PC A05/MF A01. Order Number DE81026308, Distribution Category MN -11	81-2200	7:5661	NTIS, PC A02/MF A01. Order Number DE81028921, Distribution Category MN -59c
DOE/LET/CI-81-2	7:5501	NTIS, PC A13/MF A01. Order Number DE81026146, Distribution Category STD -91	81-2288	7:5278	NTIS, PC A03/MF A01. Order Number DE81028903, Distribution Category MN -59c
DOE/MA-0021	7:5274	NTIS, PC A10/MF A01. Order Number DE81028253, Distribution Category MN -13	81-2309	7:5509	NTIS, PC A02/MF A01. Order Number DE81028698, Distribution Category MN -41
DOE/PE/70278-T16	7:5569	NTIS, PC A03/MF A01. Order Number DE81025579, Distribution Category MN -98B	LBL- 12640	7:5357	NTIS, PC A09/MF A01. Order Number DE81029854, Distribution Category MN -11
T17	7:5502	NTIS, PC A06/MF A01. Order Number DE81025580, Distribution Category MN -98B	12752	7:5662	NTIS, PC A02/MF A01. Order Number DE81028015, Distribution Category MN -59c
DOE/R5/10248-T1	7:5423	NTIS, PC A05/MF A01. Order Number DE81028667, Distribution Category MN -13	MASEC-FC- 81-038	7:5663	NTIS, PC A02/MF A01. Order Number DE81027981, Distribution Category MN -59a
DOE/RG/06666-T1	7:5570	NTIS, PC A11/MF A01. Order Number DE81027289, Distribution Category MN -98E	MIT-EL- 79-019	7:5358	NTIS, PC A04/MF A01. Order Number DE81029732, Distribution Category MN -11
DOE/SF/01952-T1	7:5656	NTIS, PC A04/MF A01. Order Number DE81027822, Distribution Category MN -95d	80-022	7:5573	NTIS, PC A09/MF A01. Order Number DE81029701, Distribution Category MN -13
DOE/SF/10601-0	7:5657	NTIS, PC A02/MF A01. Distribution Category MN -62c	81-009	7:5296	NTIS, PC A03/MF A01. Order Number DE81029726, Distribution Category MN -92
DOE/SF/10854-T1	7:5658	NTIS, PC A24/MF A01. Order Number DE81028442, Distribution Category MN -66i	81-011	7:5574	NTIS, PC A09/MF A01. Order Number DE81029731, Distribution Category MN -97
DOE/TIC-11486	7:5415	NTIS, PC A04/MF A01. Order Number DE81030179, Distribution Category MN -95f	MTR- 80W/15	7:5377	See DOE/ET/25407-1
1029964	7:5571	GPO, \$127.00. Distribution Category ND -97e	22596	7:5297	EPRI, Palo Alto, CA
DOE/US-31017	7:5503	NTIS, PC A05/MF A01. Order Number DE81023577, Distribution Category MN -98B	22596	7:5575	EPRI, Palo Alto, CA. Distribution Category MN -97
EMD- 2-65-2214	7:5652	Santa Fe, NM; New Mexico Energy and Minerals Dept. (1981). See NP-1903562	22596	7:5576	EPRI, Palo Alto, CA
2-68-1504 81-45	7:5359	General Accounting Office, Gaithersburg, MD. Distribution Category MN -92	22596	7:5577	EPRI, Palo Alto, CA
81-76	7:5385	General Accounting Office, Gaithersburg, MD. Distribution Category MN -2	22596	7:5578	EPRI, Palo Alto, CA
EPRI-EA- 1956-Vol.2	7:5277	NTIS, PC A07/MF A01. Distribution Category MN -98F	22596	7:5579	EPRI, Palo Alto, CA
1957	7:5659	NTIS, PC A03/MF A01. Order Number DE81903739, Distribution Category MN -58b	22596	7:5580	EPRI, Palo Alto, CA
FE- 3120-2	7:5500	See DOE/ET/10033-T1	22596	7:5581	EPRI, Palo Alto, CA
			1903562	7:5582	EPRI, Palo Alto, CA
				7:5583	EPRI, Palo Alto, CA
				7:5584	EPRI, Palo Alto, CA
				7:5585	EPRI, Palo Alto, CA
				7:5586	EPRI, Palo Alto, CA
				7:5587	EPRI, Palo Alto, CA
				7:5588	EPRI, Palo Alto, CA
				7:5589	EPRI, Palo Alto, CA
				7:5590	EPRI, Palo Alto, CA
				7:5591	EPRI, Palo Alto, CA
				7:5592	EPRI, Palo Alto, CA
				7:5593	EPRI, Palo Alto, CA
				7:5594	EPRI, Palo Alto, CA
				7:5595	EPRI, Palo Alto, CA
				7:5596	EPRI, Palo Alto, CA
				7:5597	EPRI, Palo Alto, CA
				7:5598	EPRI, Palo Alto, CA
				7:5599	EPRI, Palo Alto, CA
				7:5600	EPRI, Palo Alto, CA
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Report No.	Abstract No.	Availability	Report No.	Abstract No.	Availability
1903961	7:5280	Rio de Janeiro, Brasil; Federative Republic of Brazil (1980).	SAND-		
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1904010	7:5424	NTIS (US Sales Only), PC A08/MF A01. Order Number DE81904010, Distribution Category MN -95d	81-1490C	7:5666	NTIS, PC A02/MF A01. Order Number DE81025394, Distribution Category MN -66
81903394	7:5652	Santa Fe, NM; New Mexico Energy and Minerals Dept. (1981).	SERI/CP-		
NYSERDA-			633-1145	7:5451	NTIS, PC A08/MF A01
80-15-Vol.1	7:5601	New York State Energy Research and Development Authority, Albany, Distribution Category MN -13	633-1145	7:5667	NTIS, PC A08/MF A01
80-15-Vol.3	7:5602	New York State Energy Research and Development Authority, Albany, Distribution Category MN -13	633-1145	7:5668	NTIS, PC A08/MF A01
80-27	7:5425	New York State Energy Research and Development Authority, Albany, Distribution Category MN -95d	SERI/TP-		
ORAU-			721-1300	7:5669	NTIS, PC A02/MF A01. Order Number DE81027938, Distribution Category MN -59c
181B	7:5664	NTIS, PC A08/MF A01. Order Number DE81028523, Distribution Category MN -98D	721-1316	7:5631	NTIS, PC A02/MF A01. Order Number DE81027937, Distribution Category MN -59
ORAU/IEA-			721-1325	7:5670	NTIS, PC A02/MF A01. Order Number DE81025473, Distribution Category MN -59c
81-6(M)	7:5331	NTIS, PC A04/MF A01. Order Number DE81028178, Distribution Category MN -11	721-1326	7:5671	NTIS, PC A02/MF A01. Order Number DE81025472, Distribution Category MN -59c
ORNL-			SERI/TR-		
5722	7:5510	NTIS, PC A10/MF A01. Order Number DE81026541, Distribution Category STD -90d	721-1119	7:5632	NTIS, PC A03/MF A01. Order Number DE81029073, Distribution Category MN -95d
ORNL/CON-			733-790R(Vol.1)	7:5633	NTIS, PC A11/MF A01. Order Number DE81028975, Distribution Category MN -58b
75	7:5426	NTIS, PC A03/MF A01. Order Number DE81029118, Distribution Category MN -95d	733-790R(Vol.2)	7:5634	NTIS, PC A09/MF A01. Order Number DE81027973, Distribution Category MN -59b
ORNL/EIS-			733-790R(Vol.3)	7:5635	NTIS, PC A09/MF A01. Order Number DE81027976, Distribution Category MN -59b
171	7:5511	NTIS, PC A15/MF A01. Order Number DE81030226, Distribution Category MN -90	762-966	7:5672	NTIS, PC A15/MF A01. Order Number DE81025792, Distribution Category MN -60
ORNL/SUB-			SOLAR/1046-		
7605/ 12-2	7:5390	NTIS, PC A04/MF A01. Order Number DE81029896, Distribution Category MN -85	81/ 50	7:5673	NTIS, PC A04/MF A01. Order Number DE81029743, Distribution Category STD -59
P-			TVA/OP/ECR-		
101-80-008	7:5279	California Energy Commission, Sacramento, CA. Distribution Category MN -98	81-19	7:5430	NTIS, PC A03/MF A01. Distribution Category MN -13
102-80-008	7:5427	California Energy Commission, Sacramento, CA. Distribution Category MN -98	UCRL-		
150-81-001	7:5512	California Energy Commission, Sacramento, CA. Distribution Category MN -98B	85526	7:5431	NTIS, PC A02/MF A01. Order Number DE81028235, Distribution Category MN -96
PB-			86543	7:5281	NTIS, PC A02/MF A01. Order Number DE81028651, Distribution Category MN -96
81-111924	7:5428	NTIS, PC A14/MF A01	UMTA-RI-		
81-116501	7:5459	NTIS PCMF A01	06-0007-80-1	7:5300	NTIS. Order Number DE81903589, Distribution Category MN -96
81-117244	7:5603	NTIS, PC A05/MF A01	WSUN-		
81-118028	7:5460	NTIS, PC A03/MF A01	75	7:5674	NTIS, PC A03/MF A01. Order Number DE81027700, Distribution Category MN -95a
81-118036	7:5461	NTIS, PC A08/MF A01			
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81-119778	7:5604	NTIS, PC A10/MF A01			
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81-121949	7:5463	NTIS, PC A02/MF A01			
81-123572	7:5298	NTIS, PC A10/MF A01			
81-123838	7:5334	NTIS, PC A02/MF A01			
81-124422	7:5391	NTIS, PC A06/MF A01			
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81-800369	7:5630	NTIS PCN01/MF N01			
PNL-					
3280	7:5392	NTIS, PC A06/MF A01. Order Number DE81026321, Distribution Category MN -41			
3774	7:5393	NTIS, PC A08/MF A01. Order Number DE81028208, Distribution Category MN -70			
3883	7:5429	NTIS, PC A05/MF A01. Order Number DE81028783, Distribution Category MN -95d			
PNL-SA-					
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